UTAH'S Wetlands Workbook

A GUIDE TO PROPER WETLANDS MANAGEMENT & DEVELOPMENT

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Special recognition goes to Scott Dawson for giving me love, support, and encouragement and for contributing countless hours of his time typing, editing, and assembling this manuscript.

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Preface

This workbook was developed through a Wetlands Protection Grant funded by the United States Environmental Protection Agency and Utah Division of Wildlife Resources. The workbook was prepared for use in a series of workshops to be conducted throughout the state of Utah in 1993 and 1994. The workbook/workshops target decision makers, land managers, planners and private citizens and are intended to aid these groups in wetland identification and classification; provide information regarding wetlands functions and values; provide guidelines for responsible development; aid in the process of obtaining a Clean Water Act Section 404 permit; and provide a list of available technical and agency resources. The first series of workshops (1993) will involve groups of seven to eight participants from approximately six regions throughout the state. The initial participants will be asked to use the workbook and comment on its effectiveness.

The second series of workshops (1994) will gain direction from the initial workshops; comments and suggestions will be incorporated to improve both the workbook and workshops. The second series of workshops will be conducted on a larger scale, involving the same types of user groups and format. The overall objective is to improve public understanding and appreciation of wetlands functions, values, regulation and protection in the state of Utah.

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Introduction

Introduction to Wetlands Workbook

This workbook is designed for all interested citizens, landowners, and potential users and managers of wetlands in the state of Utah. The main objective of the workbook is to provide some basic tools for determining whether a wetland is present and what to do if you have one on your property. The workbook is also intended to clarify existing wetland policies and laws and relative roles of the agencies involved in wetlands regulation. It is also hoped that in working with this manual, the user will become more familiar with and appreciative of the importance of wetland functions and values. In order to be effective, we suggest that you read the entire contents of the workbook before using it practically. You may then refer to individual chapters and appendices when you have a specific problem or question. This approach will enable you to make better, well informed decisions.

OBJECTIVES OF THE WORKBOOK

The workbook is designed to address some specific wetlands related issues. This workbook is intended to:

- Help the user identify, classify, and evaluate wetlands
- Provide directives for responsible development, mitigation, and enhancement
- Clarify existing wetlands policies and regulations
- Provide sources of information for wetlands users
- Clarify jurisdiction of regulatory agencies
- Educate the user with respect to the importance of wetlands functions and values

WHO SHOULD USE THE WORKBOOK?

Potential users of this workbook include:

- Decision makers
- Land developers
- Construction contractors
- Agricultural land users
- Land use planners
- Natural resource managers
- Private landowners
- Conservation organizations

What are the types of activities which may require the use of the workbook?

Many people are confused with respect to what they can and cannot do in a wetland. Following is a partial list of activities which may require the use of the workbook:

- Draining or filling wetlands

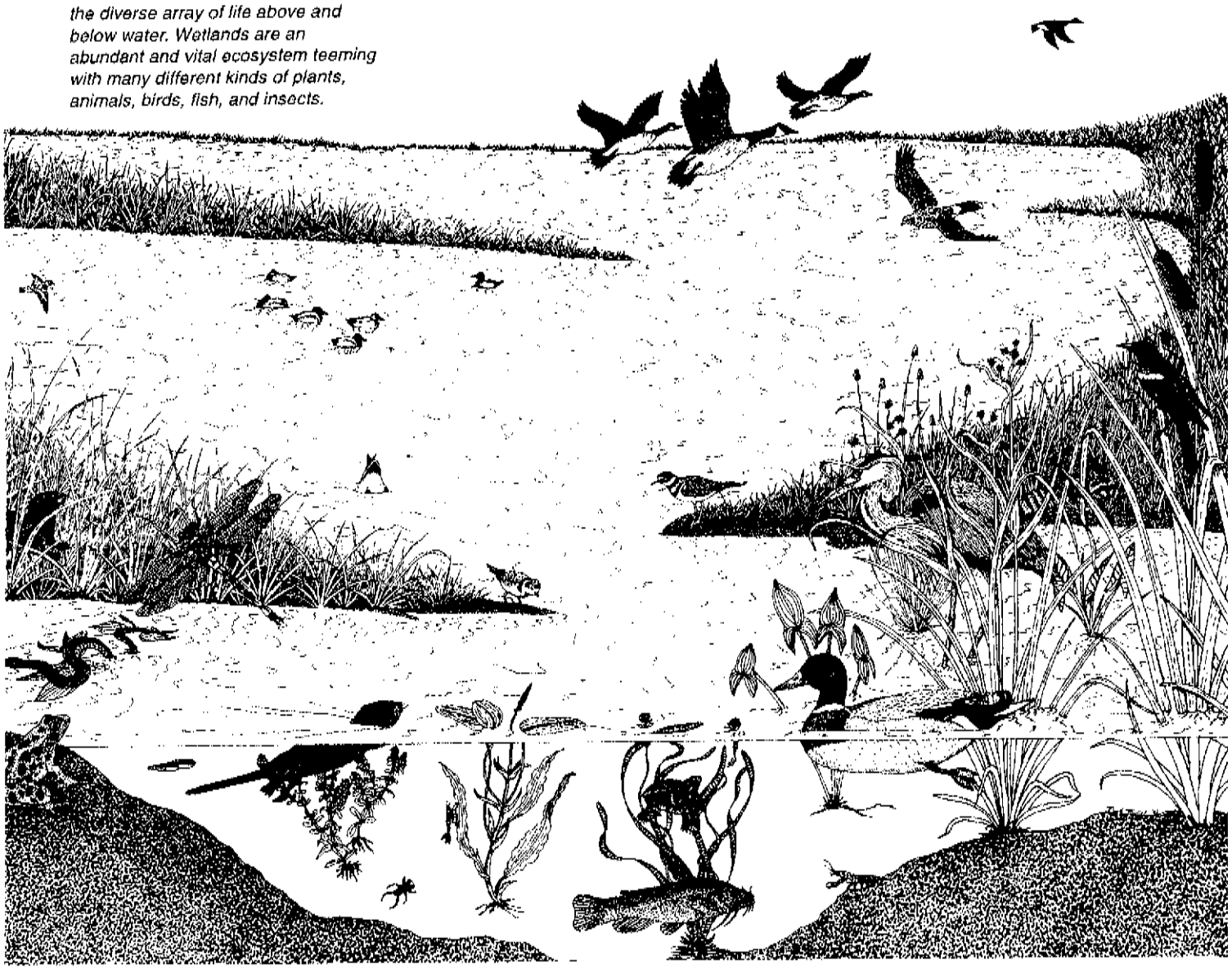
All wetlands have three features in common: water, hydric soils, and specialized plant communities

- Converting natural wetlands by diverting or blocking natural drainage and flow
- Construction of buildings on "dry" wetlands
- Creating wetlands through irrigation
- Creating ponds with impoundments
- Removal of woody vegetation in natural wetlands
- Mitigating areas for impacted wetlands
- Enhancing existing wetlands
- Moving or modifying a stream channel

What is a wetland?

Wetlands are WET LANDS and usually lie between dry land and open water. Some wetlands are wet for a few days or as long as several weeks. Some wetlands are dry more than they are wet and some are wet year-round. A wetland is NOT a wasteland as many people have thought in the past. Wetlands are some of the most productive and vital features on the landscape.

Cross-section of a wetland showing the diverse array of life above and below water. Wetlands are an abundant and vital ecosystem teeming with many different kinds of plants, animals, birds, fish, and insects.



No matter what name you might give them, all wetlands have three features in common: **water, hydric soils, and specialized plant communities.** While the nature of these features may vary from wetland to wetland, they share some common characteristics:

Water

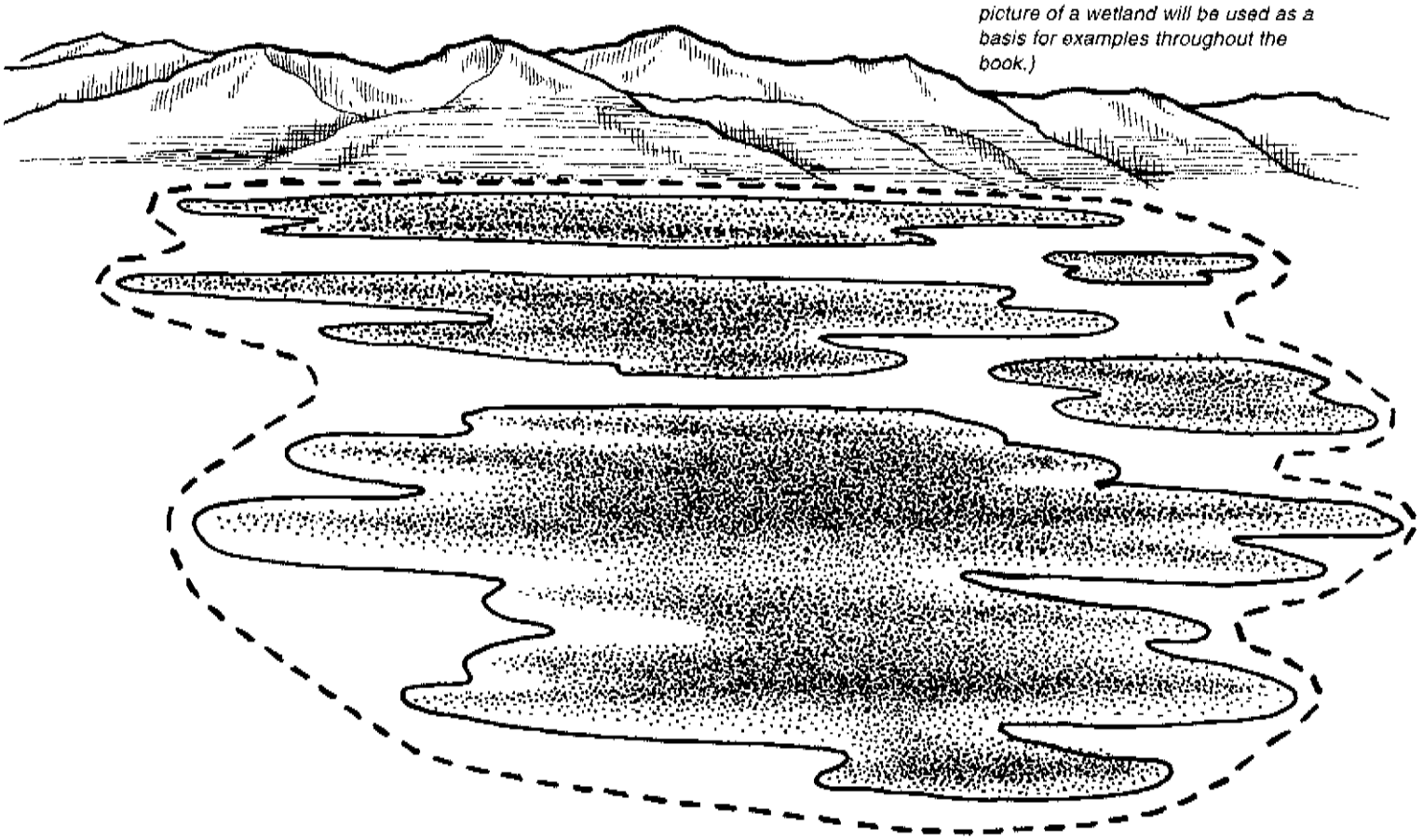
Wetlands are sometimes or always covered with water. This means some wetlands support standing water year-round, while others may only support standing water for a few months or weeks out of the year. Several definitions of "how wet is wet" have been offered by different agencies. The U.S. Fish and Wildlife Service defines wetlands as

"...lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water...at some time during the growing season...".

The U.S. Army Corps of Engineers and the Environmental Protection Agency jointly define wetlands as

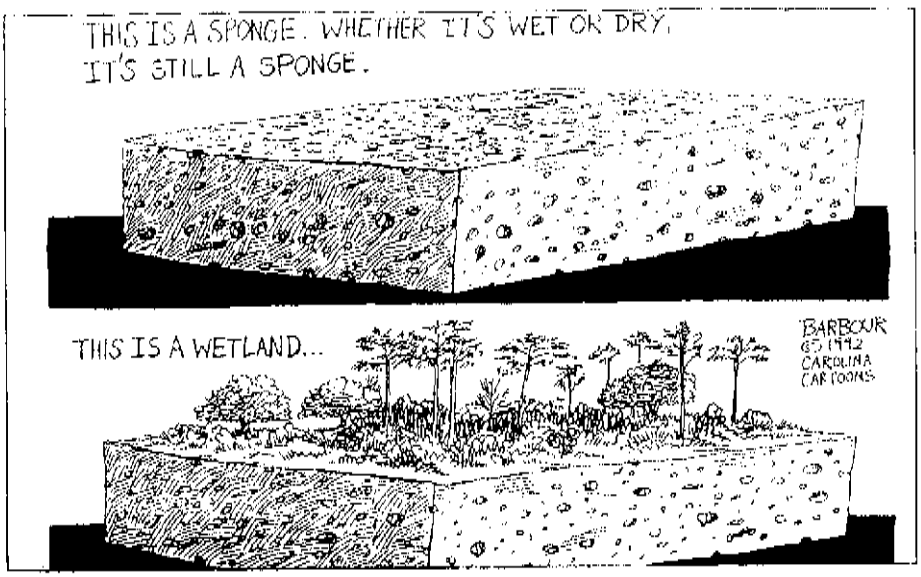
"...areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions and ... inundated either permanently or periodically at mean water depths less than or equal to 6.6 ft, or the soil is saturated to the surface at some time during the growing season of the prevalent vegetation...".

Several definitions of "how wet is wet" have been offered by different agencies.



Pictured is a wetland complex with two sets of boundaries. The dashed line delineates the wetland's true ecological boundaries and encompasses the whole complex. This would be the most likely boundary obtained if you were using the U.S. Fish and Wildlife Service's definition of a wetland. The solid lines drawn around the shaded areas delineate the wetland's jurisdictional boundaries and encompasses only the wetted areas. These would be the most likely boundaries obtained if you were using the U.S. Army Corps of Engineers regulatory definition of a wetland. (This picture of a wetland will be used as a basis for examples throughout the book.)

Just as a sponge does not cease to be a sponge when it is dry, a wetland does not cease being a wetland when it has no water.



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Soil

Wetland soils are hydric, meaning they are saturated with water. When soil is under water for prolonged periods it undergoes certain physical changes. It changes color and retains little or no oxygen. This lack of oxygen causes chemical reactions with elements such as iron, phophorous, and sulfur. Depending on the frequency and duration of soil saturation, these reactions may leave behind mottles or spots of contrasting colors in the soil. If you dig up soil in a marsh you may see small reddish-orange spots indicating the presence of iron. If the duration of soil saturation is for very long periods of time, soils will become uniformly dark in color. The Soil Conservation Service maintains lists and maps of most of the hydric soils in the United States. Hydric soils are often of interest to farmers because few cultivated plants can grow in saturated conditions.

Plants

Wetland soil conditions are extreme, therefore only certain kinds of plants are able to live there. Plants that grow in wetlands are called **hydrophytes** meaning they are "water-lovers." Wetland plants are able to survive with little or no oxygen and can withstand fluctuating water levels. The two types of hydrophytes that grow in wetlands are *aquatic* and *emergent* plants. Aquatic plants are plants that actually grow in water and can have floating flowers, leaves, and roots. Examples of aquatic plants are pondweed and waterlily. Emergent plants grow rooted in the soil below water and can include some species of trees and shrubs. Examples of emergent plants are cattails, reeds, and sedges. These, and many other species of plants, have special adaptations which allow them to survive extreme wetland soil and water conditions.

People are often confused when they hear someone refer to a dry field as a wetland and rightly so! ***How can a wetland be a wetland if it is dry?***

We need to remember, however, that water is only one component of the definition of a wetland. Soils and plants are equally important. If hydric soils and hydrophytic vegetation are found, we can be sure *water is present for at least some period of time during the year*; the soils and vegetation would not be there in the complete absence of water. And that is indeed the nature of a wetland. Fluctuating water levels are the norm, not the exception. A wetland does not cease to be a wetland because it has no water!

WETLANDS IN UTAH

Environmental conditions in Utah vary considerably from one year to the next. What was a shallow lake last year may be a dry field this year. Much of the area surrounding the Great Salt Lake has been classified as wetlands. However, these are not the only wetlands in the state.

We have many different types of wetlands in Utah such as the dry playas found in the southern portions of the state, the wet meadows found at higher elevations in the Wasatch and Uinta mountains, and the riparian or streamside wetlands found along the Bear and Jordan rivers.

Most of Utah's wetlands are associated with river deltas and lake margins. Wetlands associated with the Great Salt Lake comprise approximately 80 percent of the total wetlands in the state. Utah's wetlands provide important habitat for migratory waterfowl and shorebirds. Utah's rivers also serve as corridors for small songbird migration and are important for survival in the arid western environment.

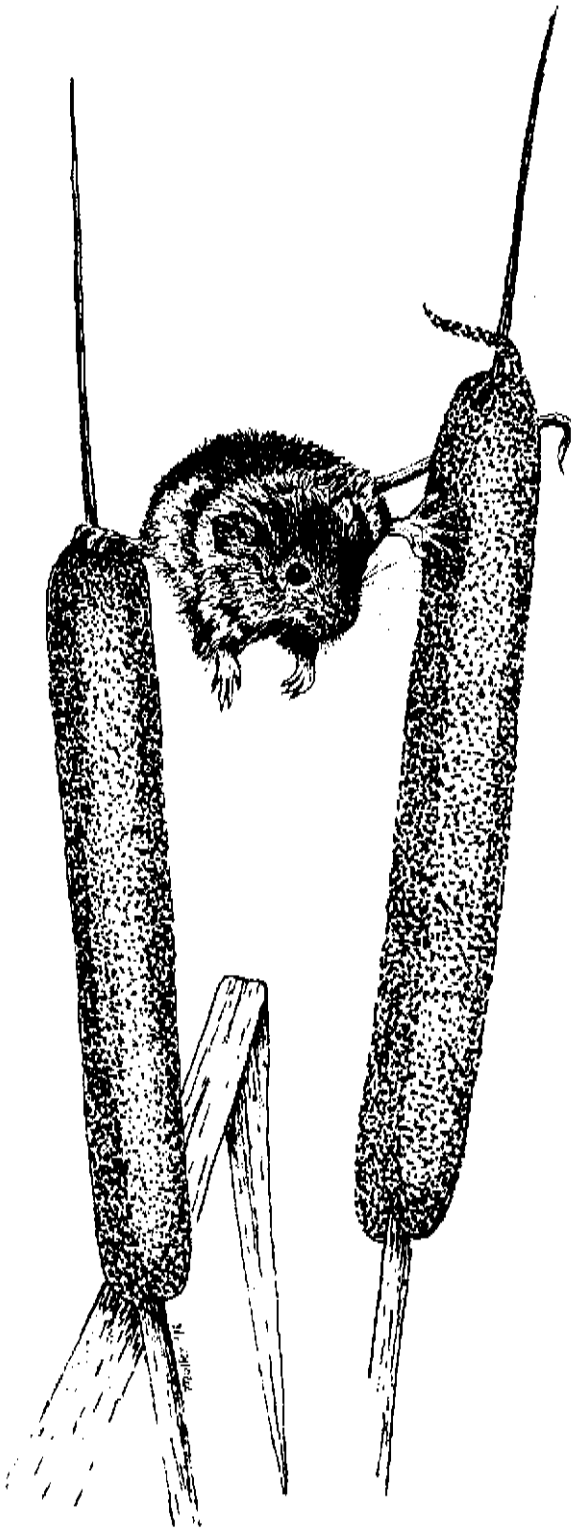
Utah's diverse wetlands are different but just as important as the prairie potholes of North Dakota, the coastal marshes of California, and the mangrove swamps of Florida. This means we must be responsible with the way we develop, manage, protect, and use these valuable resources.

SUMMARY

Why do we need to bother regulating activities on wetlands? Why should we be concerned with responsible management?

Recently, scientists have begun to understand that wetlands are an important part of a healthy environment. Wetlands control floods, maintain good water quality, and filter pollutants naturally. Scientists estimate that approximately 40 to 50 percent of North American wetlands may have been lost since the 1700s. It is estimated that Utah has lost approximately 30 percent of its original wetland acreage. Recent federal goals have recognized the value of a no net loss policy. We are encouraged to manage and use these areas responsibly and in many cases are mandated by law to do so. Use of this workbook to clarify procedures and directives toward this goal may help prevent costly errors and fines to both the user and the public.

Much of the area surrounding the Great Salt Lake has been classified as wetlands. However, these are not the only wetlands in the state.



Wetlands functions and values

CHAPTER 2

Wetlands are important for many reasons. They provide many valuable and beneficial functions. Some of these functions are:

- Water quality and purification
- Wastewater treatment
- Flood control and storage
- Wildlife habitat
- Food chain/life support
- Economic and cultural values

WATER QUALITY

Wetlands are natural wastewater treatment plants. When water enters a wetland from another source, such as a river or canal, it is often laden with toxins or can be heavily sedimented. As slow moving water crosses through a wetland, suspended particles filter down and settle at the bottom. In this way, toxic substances are rendered harmless by becoming buried and trapped in bottom sediments. Plants and invertebrates in the wetlands can also absorb toxins from the water and return them to the system in benign forms. Wetlands can be especially good at removing several types of pollutants.

- Heavy metals
- Pesticides
- Excess nutrients

Stormwater, industrial runoff, and irrigation return water often result in high levels of these types of pollutants. If allowed to accumulate, heavy metals can become lethal to both humans and wildlife. Pesticides can directly affect water quality and indirectly impact wildlife when concentrated. Although nutrients, such as nitrogen and phosphorous, are necessary for plants and animals to grow, too much can cause problems. At high levels, these nutrients can encourage lake eutrophication which depletes oxygen and kills fish. High levels of nitrates and nitrites in drinking water can also be lethal to children and livestock. Wetlands maintain good water quality by minimizing the negative effects of these pollutants.

Wastewater treatment

Humans can learn from nature's method and have sought to benefit from the natural water purification offered by wetlands. Wetlands are efficient pollutant filters. More and more wastewater facilities are using constructed wetlands and retention ponds to treat sewage and industrial water. Two such examples are the Murray City Jordan River Demonstration Area and the Salt Lake City Water Reclamation Plant. Both use a series of settling ponds to remove toxins and sediments from wastewater before it reenters the Jordan River. Water flows from pond to pond, losing pollutants and becoming increasingly more purified as it moves through the system.

As flood-water rushes down a river channel, it picks up speed and force. Its destructive force is minimized, however, if along its course, the floodwaters encounter a wetland.

The Murray City project incorporates the nearby Murray City golf course into its design. Settling ponds located on the golf course receive storm runoff and irrigation return water. These ponds are aesthetically integrated into the design of the course and are joined by open, vegetated waterways. The ponds are connected by a conduit to a constructed wetlands below the course on the Jordan River floodplain. A restored oxbow, or old river channel, also intercepts agricultural return and urban runoff water. Water flows from the wetlands into the river, considerably cleaner than when it first entered the system.

The Salt Lake City facility releases treated sewage into a series of constructed wetlands built to provide wildlife habitat and purify water. Water entering the wetlands is already treated to acceptable environmental standards, but undergoes further treatment as it travels through the marsh complex. Facility managers have landscaped the area such that wildlife may use it as well. Several species of waterfowl and shorebirds nest successfully at the facility. Plans are currently being drawn to create trails and viewing platforms for public use of the area.

Flood control and storage

Wetlands usually occur in ground surface depressions and are therefore natural flood control structures. Several studies have also shown that wetlands are key components for conveying flood waters on river floodplains. As flood-water rushes down a river channel, it picks up speed and force. Its destructive force is minimized, however, if along its course, the floodwater encounters a wetland. When floodwater enters a wetland, its force and velocity dissipate. In this way, downstream damage is lessened.

Wetlands also serve as floodwater storage basins. In periods of high flow, during spring snowmelt for example, wetlands reduce peak flows and capture excess runoff. Water is stored in the wetlands and released slowly over the following drier months. This phenomenon is well illustrated by systems such as the wet meadows found in the Albion basin near the town of Alta. These subalpine meadows are saturated throughout the summer months. This is due to the slow release of snowmelt stored behind landforms above the meadows. This snowmelt is the basis for the headwaters of Little Cottonwood Creek, an important source of water for the Salt Lake Valley.

Because wetlands are so efficient at flood control, engineers have begun to use them to reduce flood damage in urban areas. One such project under construction is the Hillview Detention Basin located off Mill Creek in Salt Lake City. The original design called for construction of a large, cement detention basin. Design plans were changed, however, and now rely less on synthetic structure and more on natural parameters. Engineers plan to utilize the existing, natural drainage basin and associated wetlands to capture and store peak flows from Mill Creek. The project will also provide wetlands habitat for wildlife use.

Wildlife Habitat

Wetlands are areas rich in natural resources. For this reason, wetlands usually have abundant and diverse wildlife populations associated with them. Hunters have known this for years. In fact, some of the first efforts to conserve wetland resources were initiated by duckhunters in the early 1900s. They were concerned with declining waterfowl populations. These early conservationists knew that the health of wildlife was directly related to the health of their habitat. This legacy lives on today in organizations such as Ducks Unlimited.

Ducks and geese are not the only animals who rely on wetlands. Many species of wildlife depend on wetlands to supply them with food, shelter, and water. Wetlands offer a unique combination of geographic and vegetative patchiness which many animals exploit. Birds and mammals rely on the protection and secrecy provided by the marsh vegetation for successful breeding, while also using the ample food resources found on the nearby land and water.

Birds such as the marsh wren, least bittern, and red-winged blackbird protect themselves from predators by building their nests above ground on cattails and bulrush. Other birds such as the great blue heron, egret, and white-faced ibis prefer to nest on the ground, but on protected islands surrounded by water. All these birds feed in or near wetlands.

Mammals like the beaver and muskrat live under water in dwellings constructed of marsh vegetation. Their lodges inadvertently provide homes for other animals such as the raccoon, mouse, and mink. Other species that use wetlands are otters and weasels. These animals feast on fish, crayfish, frogs, and other small mammals which are plentiful in marshes and wet meadows. Large grazing mammals such as the moose, elk, and deer are also attracted to feed on the lush vegetation found in wetlands.

Wetlands are important to fish, amphibians, and reptiles as well. Studies have shown that wetlands adjacent to lakes and streams also serve as important nursery areas for many young fish. Riparian wetlands have trees that shade the water, keep it cool, and provide cover habitat for fish. Wetlands also provide year-round homes to salamanders, frogs, toads, turtles, and snakes. Large populations of these animals provide a rich food source for other animals living in wetlands.

Insects can be extremely bountiful in wetlands as anyone who lives near the Great Salt Lake can attest. Mosquitos, midges, and flies do well here because of the presence of water. Eggs are laid and larvae develop underwater, but adult forms become airborne. Although these insects are a nuisance to humans, they are an important source of food for many species of birds, fish, amphibians, and reptiles.

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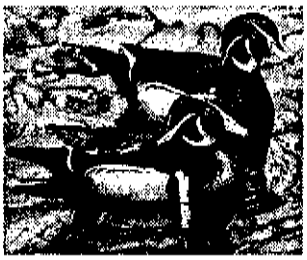

Food chain support

Wetlands are able to support very complex and extended food chains. Food chains are comprised of three major groups: producers, consumers, and decomposers.

Wetland plants are **producers** because they make food for other organisms. We say plants are **primary producers** because they make their own food and do not need to eat other animals or plants to survive. Plants produce food through a chemical process called photosynthesis. In photosynthesis, plants convert water and carbon dioxide into carbohydrates and sugars. Wetlands are generally rich in the kinds of nutrients and resources plants need to thrive. Therefore, wetlands are able support a diverse and abundant plant community.

A **consumer** is any organism that cannot create its own food and needs to eat other organisms to survive. **Primary consumers** are those that gain their energy from eating plants. Examples of primary consumption in the wetland are insects grazing on stalks; waterfowl skimming floating seeds and leaves; beaver and muskrat chewing woody stems and bark; and elk and moose consuming leafy emergent stems and shrubs. **Secondary consumers** are those organisms that eat primary consumers. Examples of secondary consumption are fish, birds, and amphibians eating insects; fish eating other fish; and birds eating fish. Because wetlands have so many plants, they are able to support many primary consumers. Many primary consumers, in turn, can support many seconday consumers.

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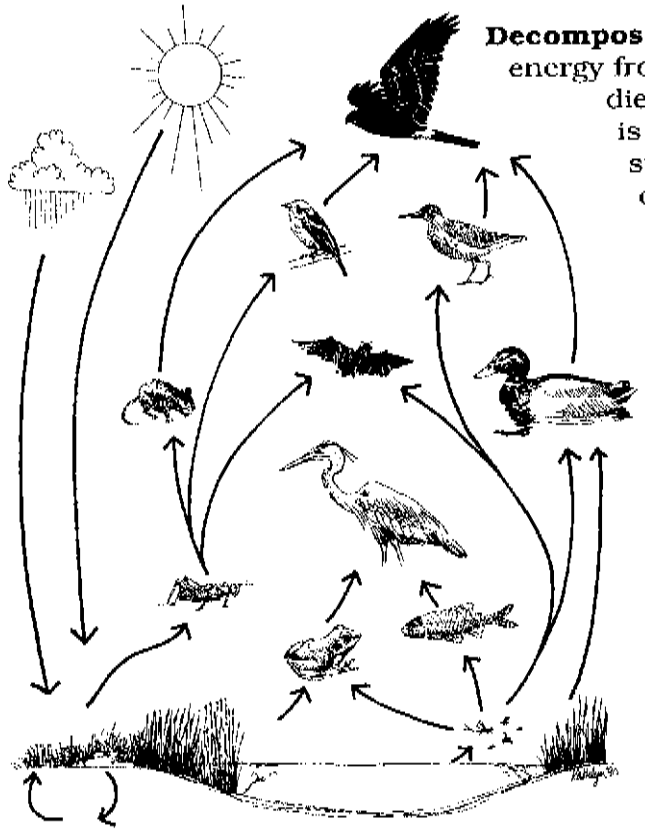


Wetlands are extremely productive areas which can support a diverse mixture of plants, animals, and insects. Wetland water and soil are high in nutrients which plants use to grow. These plants provide food for a variety of different insects, birds, and mammals which, in turn, also supply food for other animals.

Decomposers are groups of organisms that gain their energy from dead organisms. When plants or animals die, they take with them their stored energy. It is the job of the decomposer to break down this stored energy and make it available again. For example, a dead leaf sitting in the mud at the bottom of a marsh will not be eaten by a primary consumer and used as energy. This loss of energy would be wasteful if it were not for the decomposer. The decomposer breaks the leaf down into its component nutrients. These nutrients are then put back into the soil and water and used by other plants to grow and produce more food. Depending on how you view this process, decomposers can be the final link or the very beginning of the food chain!

Scientists can assess the productivity of an ecosystem by the extent of its food chain. Highly productive areas have very complex and lengthy food chains. Therefore, wetlands are one of the earth's most diverse and highly "productive" systems.

Cultural values

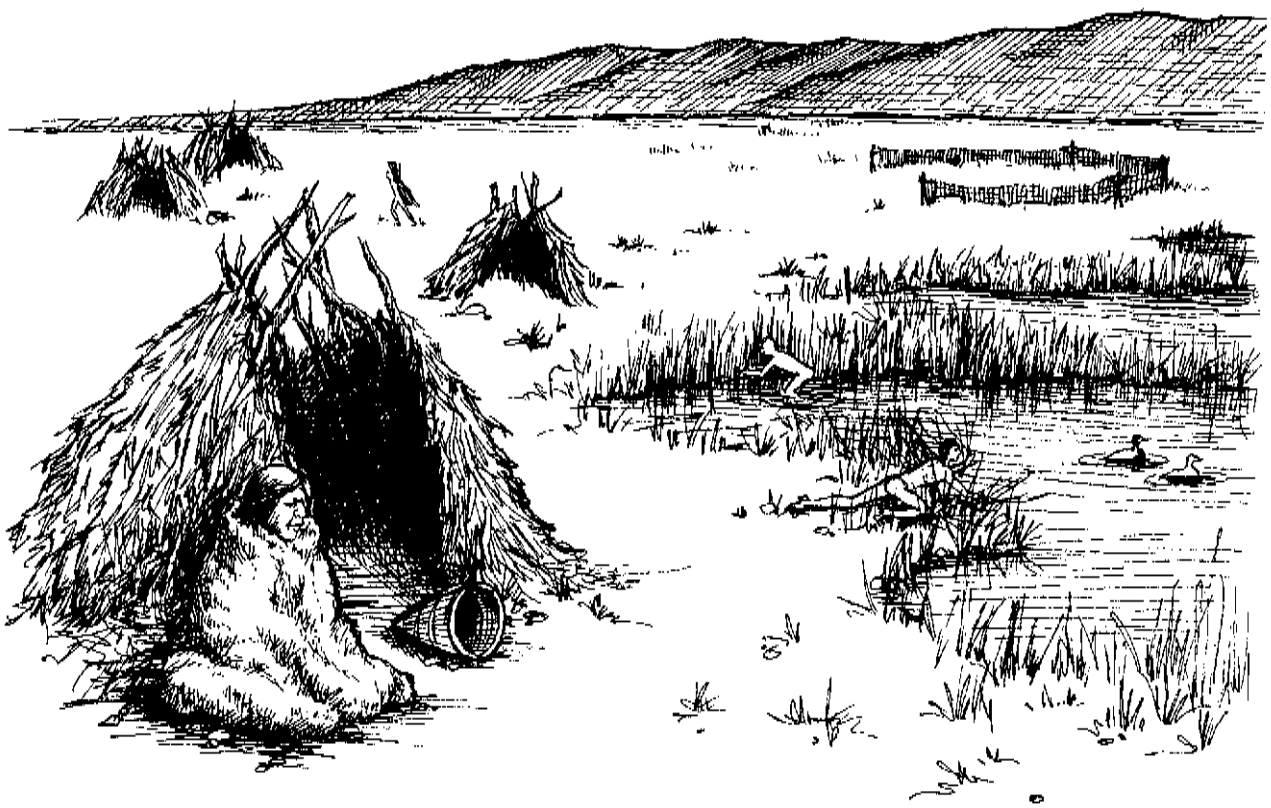
There are over 70,000 prehistoric and 10,000 historic sites in Utah and more are found every year. These sites are identified by the presence of archaeological artifacts. Some of these prehistoric and historic sites are easy to identify, like the Tintic Mine sites in Tooele County or Anasazi cliff dwellings in southern Utah. Other sites are harder to find. Artifacts found at these these sites include chips of stone, pieces of bone and pottery.

Water has always been important to the survival of humans. The presence of water directed the actions of early humans inhabiting Utah during prehistoric times as much as the modern farmer who arrived here in the 1850s. Many important cultural sites are found near bodies of water such as rivers and lakes. The modern town of Richfield is built on a Fremont Indian farming village established near the Sevier River 1000 years ago!

As the Great Salt Lake rises and recedes, many artifacts and burial sites are exposed. In the mid-1980s, a mammoth skeleton was unearthed near Joe's Valley Reservoir in Carbon County. Scientists determined that this mammoth had died in a large marshy area in central Utah. These historic and prehistoric resources are extremely valuable to researchers who attempt to piece together the history of past cultures and climates. Wetlands play a critical role in understanding Utah's history.

...the town of Richfield is built upon a Fremont Indian farming village established 1000 years ago!

Wetlands have played an important role in human history. The abundance of wildlife and plants in these areas provided early humans with food, shelter and water. Early natives made their homes in these areas to hunt waterfowl, herd rabbits and other small mammals, and use plants for food and shelter. Even in modern day, wetlands provide humans with abundant resources.



It is difficult to measure the importance of a system that sustains life, purifies water, and holds secrets to our past. We can, however, imagine what the world would be like without wetlands: more flooding, less vegetation, more drought and less wildlife.

Economic values

Wetlands also possess high present-day economic value, but this was not always the case. In the past, these areas were considered "wastelands" that no one wanted or could use until drained and filled with dirt. Today, however, wetland property can be extremely expensive to develop. Filling and developing wetlands requires a federal permit. Frequently, the permit requires the developer to compensate for impacts to the wetland through a process called mitigation. Mitigation can be extremely costly at ten to twenty-five thousand dollars per acre! Many developers make the decision to find an alternative site or work the wetland into their project design in order to minimize impacts and avoid mitigation.

An emerging trend in housing and industrial development is the incorporation of natural areas, such as wetlands, into project design. This often results in higher property values for the project, since people are often willing to pay more for housing if it is near a natural area. It is also usually cheaper for the developer than filling the wetland and building on top of it since this practice is federally regulated and may require an expensive mitigation.

Many housing and commercial developments are now being built nearby or around wetlands. Such complexes provide an aesthetic and restful atmosphere for residents and employees. Developers have recognized the demand for such surroundings and are responding by building projects with names like Lakeview Estates and Marsh Hollow Business Park.

THE INTANGIBLE VALUE OF WETLANDS

It is hard to put a monetary figure on all the benefits wetlands provide. It is difficult to measure the importance of a system that sustains life, purifies water, and holds secrets to our past. We can, however, imagine what the world would be like without wetlands: more flooding, less vegetation, more drought and less wildlife. Fewer wetlands means more dust, dirtier air, and polluted water.

Wetlands are are all around us. Deserts and mountains alike have wetlands which provide us with the same benefits in variant forms. Wetlands conservation means protection, as well as use. Wise use of our wetlands ensures protection of their valuable functions and maximizes the benefits derived by all.

Wetland identification and classification

CHAPTER 3

The diverse climate and topography of Utah results in a wide, varied array of wetland types. Some of the types of wetlands in Utah are:

- Salt marshes
- Riparian wetlands
- Forested wetlands
- Playas
- Saltflats
- Freshwater ponds
- Mudflats
- Wet meadows
- Wet lake margins
- Subalpine/montane wetlands

Identifying wetlands in Utah is often difficult due to the many forms in which they occur. Identification is easy when an area is wet, but not all wetlands are wet all of the time! How, then, are we supposed to know if we have a wetland?

Identifying and classifying wetlands make planning and management of these sensitive areas more effective. In this chapter we will discuss how to correctly identify a wetland (i.e., do I or don't I have one on my property?). We will also be able to classify one type of wetland from another so we can learn more about it. To identify wetlands, we use the area's soils, vegetation, and water regime. To classify wetlands, we use the surrounding area, aquatic environment, and type of vegetation present.

This chapter has three sections. The first two briefly present some of the current methods in use for wetland identification and classification. The third is a section of photographs taken around the state of Utah at various times of the year.

These photos should aid you in identification and classification of the wetlands in your area.

The following methods are presented in a question-and-answer format designed to be used in the field. In the subsequent chapters you will learn what you can do with the information gained in this chapter.

IDENTIFICATION

Three frequently used criteria for wetland identification are soils, vegetation, and hydrology. The most difficult of these to assess by a layperson is vegetation. Plant identification is best left to the experts, but there are a few that are characteristically present in wet areas. Soils and hydrology are relatively easier; soils can often be diagnosed by color, type, or from maps, and hydrology by the presence of water, either above or below ground. Answer the following questions to determine whether you do or do not have a wetland. The questions are designed to encompass all wetland types in the state of Utah; not all will apply to the area you are investigating.

1 Is there any indication of water, past or present? Standing or ponded water? A round or irregular patch of green vegetation in the center of dried vegetation? Are there any drift lines—matted, brown vegetation lying in the direction of waterflow?

Consultation from state and federal agencies is free and may save you money and headaches in the long run.

2. Are there any benchmarks or lines indicating recession of water levels in the area?
3. If there are trees in the area, are there any water marks on the trunks—lines indicating levels of past inundation? Are the trees cottonwoods, willows, aspens, or tamarisk? If there are no trees, are there bulrushes or cattails nearby?
4. Are there sedges or rushes present? (Both look like dark green grasses, but sedges have triangular, or edged, stems and rushes usually have hollow, rounded stems.)
5. If you dig a hole 12 inches in the ground during the seasonal high water level, does it partially fill with water? If not, is the soil moist? Does it stick together? Can you form a ball by rolling it between your hands?
6. Is the soil very dark brown or grey-green? Is it made of decaying plant material? Does it have a sulfurous odor?
7. Does the area have a thin layer of salt encrusted on the soil?
8. Is the area near a stream, river, or lake? Are you on a river floodplain or wet riparian zone?
9. Is the ground spongy underfoot? Does water seep from the ground around your shoes when you step on it?
10. Is the area in a topographic depression?

If you answered yes to any of these questions, you may have a wetland in your area. If so, you may be subject to federal regulation. Questions should be directed to any of the appropriate officials listed in Appendix B. If you have any question, do not hesitate to call for consultation. Consultation from state and federal agencies is free and may save you money and headaches in the long run. ***When in doubt, ASK!***

CLASSIFICATION

Once you determine that you have a wetland, you can classify it to determine what type of wetland it is. Why? Classifying allows us to infer a lot about a wetland without having to give a long-winded description. For example, if someone tells you that a wetland is a *Lacustrine emergent wetland*, you know it is associated with a lake and has greater than 30 percent of its area covered with half-submerged plants such as cattail and bulrush. Just two words tell you all that! Knowing the location of the wetland also allows us to determine what other information has been gathered about that area, such as soils and hydrology. Such information is valuable in the planning, permitting, and mitigation process.

One of the most frequently used classification systems is the Cowardin system (Cowardin, et al. 1979). The U.S. Fish and Wildlife Service (FWS) is in the process of classifying all wetlands in the United States using this system. This program is called the National Wetlands Inventory (NWI) and is expected to be completed by 1998. Much of this information has already been gathered and is available for use. NWI maps can be obtained for a cost from the Utah State Office of the Automated Geographic Reference Center or from the federal offices listed in Appendix A.

Unfortunately, very little of Utah has been inventoried by the FWS. Only the wetlands in the north-central portion of the state have been surveyed. Since so little information has been gathered, chances are good that nothing will be available about the particular wetland you have identified. It is important that you collect as much information as you can about the area by answering the following questions:

Location

(1) What is the address or approximate location of the wetland? (available on USGS topographic maps)
- (a) County
- (b) Township/Range
- (c) UTMS (if known) .....

Classification

(2) Has wetland been mapped by the FWS NWI? (Consult attached map in Appendix A to determine where NWI maps are available.)
- (a) If yes, name of NWI map:
- (b) Classification according to NWI map:

If the wetland has not been mapped by NWI use the following key based on the Cowardin system to classify it. The Cowardin system is *hierarchical* meaning it uses increasingly more detailed information to describe the wetland in a top-down fashion. The grossest level of detail is the system, followed by the subsystem, class, subclass and dominance type.

Use the following key to determine what system, subsystem, and class best describe the wetland in which you are interested. This key does not classify to the subclass and dominance type levels. The first three levels provide sufficient information for the purposes of this workbook.

Instructions on using the key

- **STEP 1:** From a high vantage point, draw a mental boundary around where you think the wetland begins or ends. This is the outside boundary.
- **STEP 2:** Look at the area within the outside boundary. Are there any distinctive zones of vegetation or abrupt changes in topography? If so, draw smaller mental boundaries within your outside boundary to demarcate the different areas. These are the inside boundaries.

  (Example: If you are looking at a basin which contains a large pond surrounded by wet meadows, your outside boundary would enclose both the wet meadows and the pond. Since the wet meadows are distinctively different from the pond, you would draw two inside boundaries. The first inside boundaries would enclose the wet meadows. The second inside boundary would just enclose the pond.)
- **STEP 3:** Choose one bold-faced option under each category (system, subsystem, and class) for each area contained within a boundary.

  You may have several different types of wetland nested within one larger area. If you have only one outside boundary with no inside boundaries, you will have only one system, subsystem, and class designation for that wetland. If you have several inside boundaries, you will have a separate system, subsystem, and class designation for each area contained within an inside boundary.

The grossest level of detail is the system, followed by the subsystem, class, subclass and dominance type.

SYSTEM

All the wetlands in Utah belong to one of three different systems: PALUSTRINE (puh-LUS-trin) or pond-like; LACUSTRINE (luh-CUS-trin) or lake-like; and RIVERINE or river-like. Now, answer the following questions to see which system best describes your wetland.

1. Is the area situated in a river channel; is water, when present, usually flowing?
   Yes ..... RIVERINE, Go to 8
   No ..... Go to 2
2. Is the area situated in a basin, depression, catchment, on level or gently sloping ground with slow moving or stationary water?
   Yes ..... Go to 3
   No ..... Unknown
3. Is the area greater than 20 acres?
   Yes ..... LACUSTRINE, Go to 7
   No ..... Go to 4
4. Is the water depth in the deepest part 6 feet or deeper?
   Yes ..... LACUSTRINE, Go to 7
   No ..... PALUSTRINE, Go to 6

Wetland Subsystem

6. Palustrine wetlands have no subsystem ..... Go to 10
7. Is the area a shoreline or playa, less than six feet deep?
   Yes ..... Littoral, Go to 10
   No ..... Limnetic, Go to 10
8. Does water flow year round?
   Yes ..... Go to 9
   No ..... Intermittent, Go to 19
9. Is water velocity slow and gradient low with a well-developed floodplain?
   Yes ..... Lower Perennial, Go to 10
   No ..... Upper Perennial, Go to 10

Wetland Class

10. Is the area vegetated?
    Yes ..... Go to 15
    No ..... Go to 11
11. Is the area a shoreline?
    Yes ..... Go to 12
    No ..... Go to 13
12. Is the shoreline comprised mainly of large rocks and boulders?(1)
    Yes ..... Rocky shore
    No ..... Unconsolidated shore
13. Can you see the bottom of the wetland?
    Yes ..... Go to 14
    No ..... Open water
14. Is the bottom comprised mainly of large rocks and boulders?
    Yes ..... Rock bottom
    No ..... Unconsolidated bottom
15. Is the wetland plant community dominated by submerged aquatic plants such as algae, pondweed, duckweed, submergod moss, or waterlily?(2)
    Yes ..... Aquatic bed
    No ..... Go to 16

FOOTNOTES

(1) Unconsolidated shore is the only option for Palustrine system shorelines.

(2) Aquatic bed is the last option for vegetated Lacustrine/limnetic and Riverine/upper perennial systems. If you answered no to this question for either of these systems, you have followed an incorrect path through the key. Return to the beginning and answer the questions until you arrive at one of the options shown in the key.

(3) Emergent is the last option for vegetated Lacustrine/littoral and Riverine/lower perennial systems. If you answered no to this question for either of these systems, you have followed an incorrect path through the key. Return to the beginning and answer the questions until you arrive at one of the options shown on the diagram.

16. Is the wetland plant community dominated by cattails, bulrush, saltgrass, or wet meadow grasses?(3)
    Yes ..... emergent
    No ..... go to 17
17. Is the ground cover dominated by sphagnum or peat (organic materials)?
    Yes ..... moss/lichen
    No ..... go to 18
18. Is the plant community comprised mainly of shrubs and trees?
    Less than 20 feet tall ..... scrub/shrub
    Greater than 20 feet tall ..... forested
19. Intermittent subsystems have only one class – Streambed

You should now have identified your wetland to a system, subsystem, and class.

Answer the following questions to obtain additional information about your site.

Water regime

1. **If the area is MOSTLY WET, choose the best descriptor:**
   (a) Permanently flooded: Water covers the land surface throughout the year in all years.
   (b) Intermittently flooded: Surface water is present throughout the year except in years of extreme drought.
   (c) Semipermanently flooded: Surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at, or very near, the land surface.
   (d) Saturated: The ground is saturated to the surface for extended periods during the growing season, but surface water is seldom present.
2. **If the area is MOSTLY DRY, choose the best descriptor:**
   (a) Seasonally flooded: Surface water is present for extended periods especially during the growing season, but is absent by the end of the season in most years. When surface water is absent, the water table is often near the land surface.
   (b) Temporarily flooded: Surface water is present for brief periods during the growing season, but the water table usually lies well below the soil surface for most of the season. Plants that grow both in uplands and wetlands are characteristic of the temporarily flooded regime.
   (c) Intermittently flooded: Surface water is present for variable periods without detectable season periodicity. Weeks, months, or even years may intervene between periods of inundation. The dominant plant communities under this regime may change as soil moisture conditions change. Some areas exhibiting this regime are not defined as wetlands because they do not have hydric soils or support hydrophytic vegetation.
3. **OTHER:**
   (a) Artificially flooded: The amount and duration of flooding is controlled by humans, such as some waterfowl management areas. Wetlands created by leakage from human-made impoundments and irrigated pastures are not included in this category.

Water quality

Water quality refers to the aquatic environment. Choose the one that best applies:

1. Salt
2. Fresh
3. Unknown

Wetland setting

1. Soils (obtain information from Soil Conservation Service soil maps)
   a. Soil type:
   b. Soil series and mapping unit:

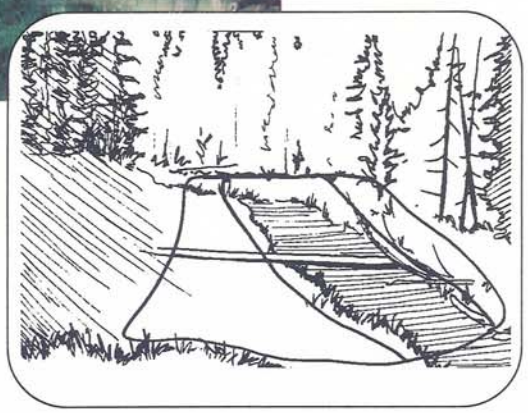
Once you have obtained this information, record what you now know about your wetland.

2. Elevation (obtain from USGS topographic map)
   a. Below 5000 ft.
   b. Between 5000 and 7000 ft.
   c. Above 7000 ft.
3. Landform setting
   a. Meadow or swale
   b. Stream channel
   c. Canyon or floodplain
   d. Lake plain or valley bottom
   e. Hillside
4. Plant community
   a. Alpine meadow
   b. Mixed conifers (e.g., spruce, fir, pine)
   c. Cattails, bulrush, or sedge
   d. Mountain brush
   e. Pinyon-juniper
   f. Grass-shrub
   g. Desert shrub
   h. Riparian trees and shrubs (willow, cottonwood, box elder)
   i. Pasture
   j. Cropland
   k. No vegetation (sand, rock, gravel, mud)
5. Land-use designation
   a. National, state, or regional park
   b. Wilderness area or wilderness study area (WSA)
   c. Wildlife management area, national wildlife refuge
   d. Other specially designated land (specify)
      e.g. Housing or commercial development, federal or state lands
6. Hydrologic setting. Indicate distance to nearest:
   a. Other wetlands
   b. River or stream
   c. Lake

Once you have obtained this information, record what you now know about your wetland. Write down the classification as well as the accompanying attribute information. You will need this to aid you in managing and developing your property and to help you through the permitting process.

Photographs

System: Riverine Sub-System: Upper Perennial Class: Unconsolidated or rock bottom
This wetland occurs in a channel, thus the system is riverine. The surrounding forest type indicates this reach of the river flows swiftly down a high gradient. Therefore, this is an upper perennial reach of the river. It is difficult to tell from this photograph, but the underlying substrate in the streambed is probably rocky. Therefore, the class would be rock bottom. If it were sandy, the class would be unconsolidated bottom.



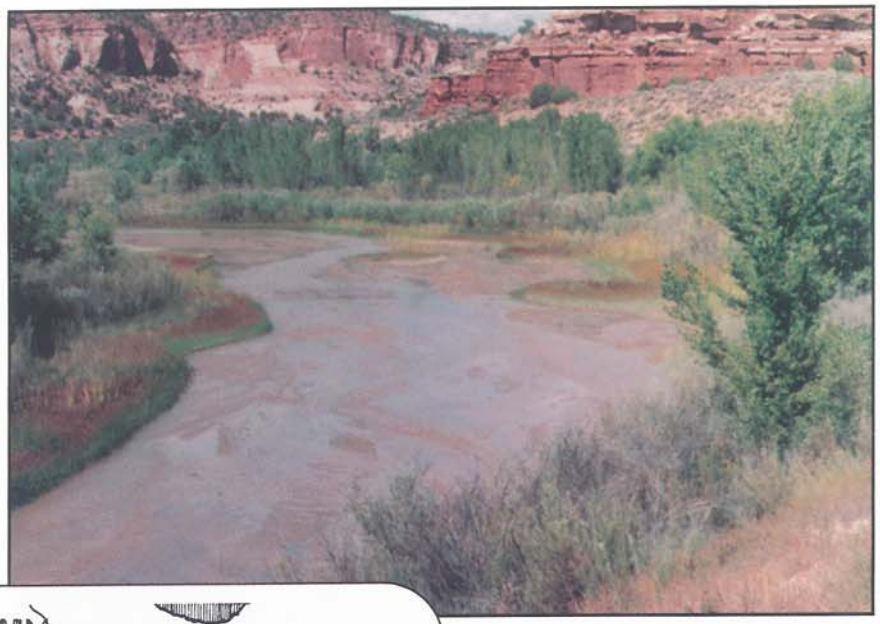
Following are photographs using the Cowardin classification scheme. The smaller boxes with line drawings illustrate the areas in the photograph which have been classified with the key. These have been chosen as examples and should aid you in your classification efforts.

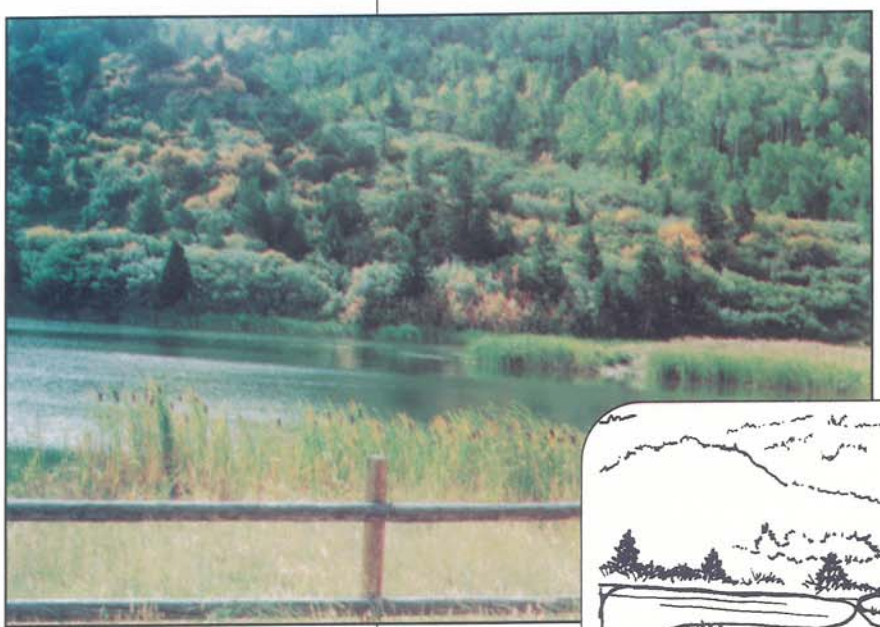
(1) System: Riverine Subsystem: Lower Perennial Class: Emergent

(2) System: Riverine Subsystem: Lower Perennial Class: Unconsolidated bottom

(3) System: Palustrine Subsystem: Scrub/shrub

There are two wetland systems present in this photograph. The river and its saturated margins are contained within a channel. Therefore, they are riverine wetlands. The topographically higher benches are wet, but not contained within the channel. Therefore, they would be classified as palustrine wetlands. The river has a low gradient and well developed floodplain. Therefore, the riverine subsystem is lower perennial. There are two wetland classes within the lower perennial subsystem. The unvegetated sandy bottom of the river would be one class: unconsolidated bottom. The dark green vegetation along the river margins comprises the second class: emergent. The palustrine wetlands have no subsystem and have only one class. The vegetation in the palustrine wetlands is comprised mainly of sagebrush, therefore, the class is scrub/shrub.

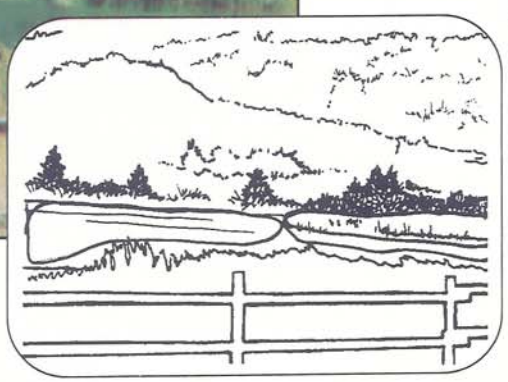




(1) System: Lacustrine Sub-system: Littoral Class: Emergent

(2) System: Lacustrine Sub-system: Limnetic Class: Rock bottom or unconsolidated bottom

This wetland is greater than 20 acres and deeper than six feet, therefore, it is a lacustrine system. The deep water portion in the center of the photograph indicates a limnetic subsystem, while the shallower lake margins indicate a littoral subsystem. The half-submerged vegetation along the lake margins indicates an emergent class is present in the littoral zone. The bottom of the lake underlying the deep water may be rocky or sandy. Thus, the limnetic subsystem may have either rock bottom or unconsolidated bottom classes. This can not be determined from the photograph.

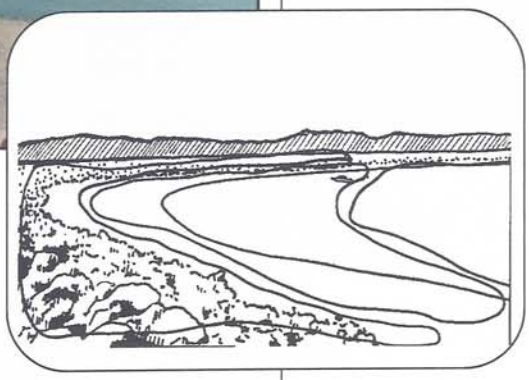


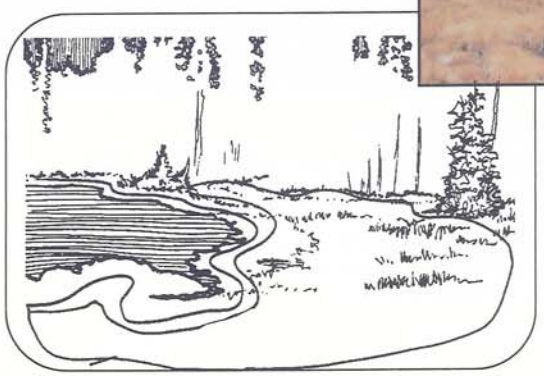
(1) System: Lacustrine Sub-system: Littoral Class: Unconsolidated shore

(2) System: Lacustrine Sub-system: Littoral Class: Rocky shore

(3) System: Lacustrine Sub-system: Limnetic Class: Unconsolidated bottom

This wetland is lake-like, therefore it is a lacustrine system. The littoral wetlands occur in the shallow water zone in the foreground, where the rocks and sand are present. The limnetic wetlands refer to the deep water portion and lake bottom, beginning in the right side of the photograph.

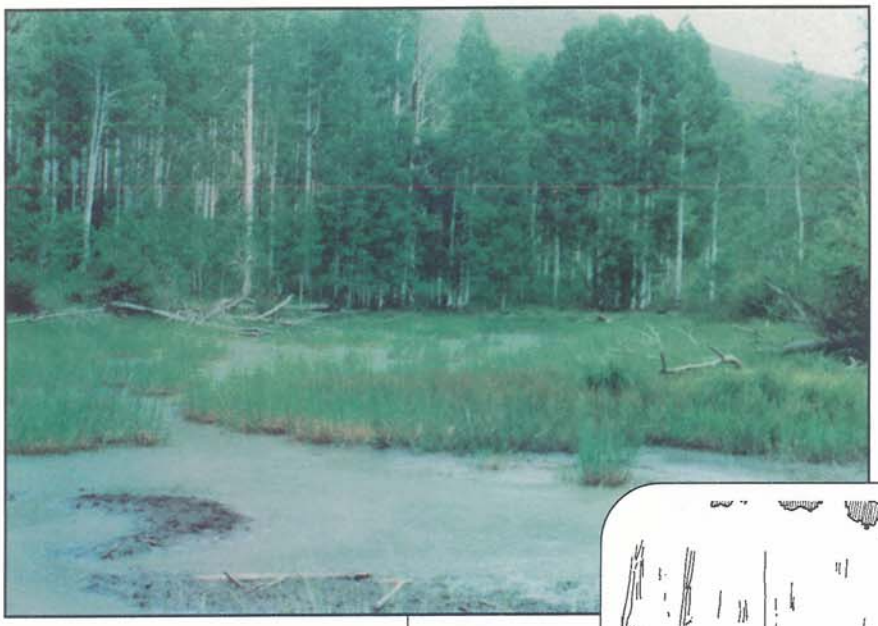




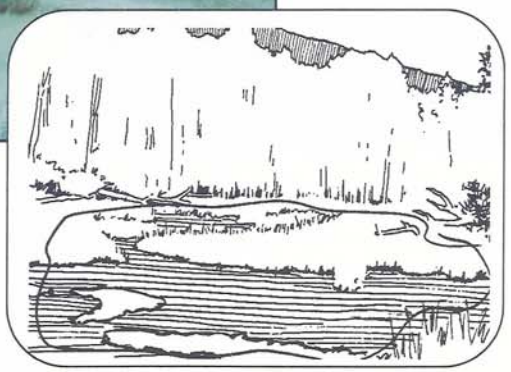
(1) System: Palustrine Class: Emergent

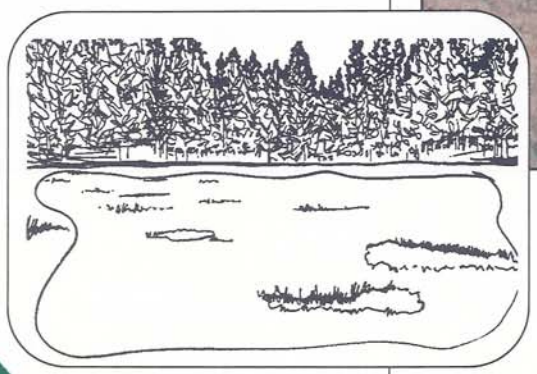
(2) System: Palustrine Class: Aquatic bed

The open water in this photograph appears to be shallow (less than six feet deep) due to the presence of rooted vegetation and also looks to be less than 20 acres. Therefore, this system is palustrine, not lacustrine. The emergent class refers to the presence of the wet meadow grasses, located along the perimeter of the water. The aquatic bed class refers to the lilypads floating in the water.



System: Palustrine Class: Emergent
This shallow, flooded meadow appears to be less than 20 acres. There is no channel present in this meadow making this a palustrine wetland. The vegetation is rooted and covers more than 30% of the area. Thus, the class is emergent.

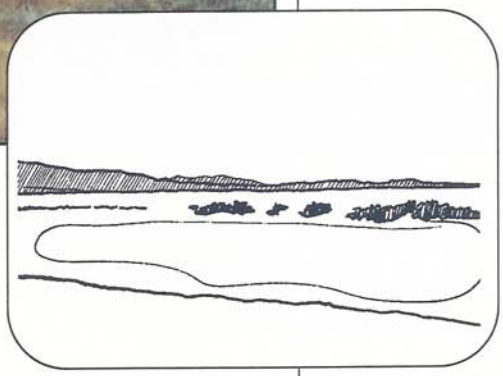




System: Palustrine Class: Emergent
This photograph was taken in the dry season, but the topographical break seen in the upper right of the picture indicates water collects in this depression during wetter times. The collection area is less than 20 acreas and the water that gathers is shallow, making this a palustrine system. The wet meadow grasses cover more than 30% of the basin, making the class emergent.

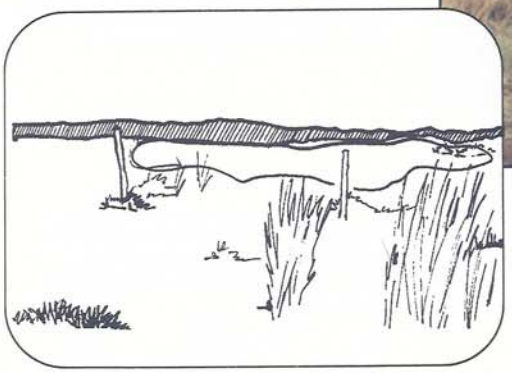
System: Palustrine Class: Unconsolidated bottom

This is a seasonally flooded wetland also known as a playa. The water that gathers in the depression in the center of the photograph is shallow and the area is less than 20 acres. Therefore, the system is palustrine. The presence of the sandy soil makes the class unconsolidated bottom. If you thought the class should be emergent or scrub-shrub, look again. Sand, not vegetation, covers more than 30% of the area where water ponds.



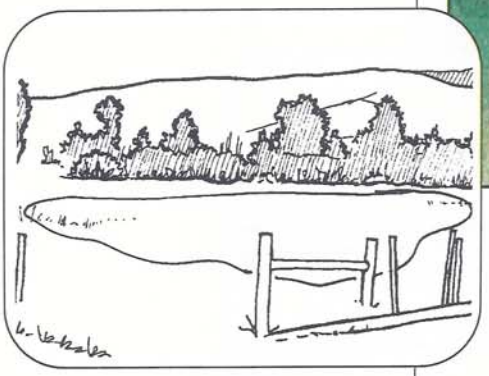
System: Palustrine Class: Scrub-shrub

This seasonally flooded wetland is also known as a playa and is similar to the wetland above. It is less than 20 acres and water would be less than six feet deep at the lowest point, therefore it is a palustrine wetland. Although not readily apparent in this photograph, greater than 30% of the area is covered with vegetation. The wetland does not contain emergent vegetation, but rather a mixture of scrub and shrubs, hence its class delimiter.



System: Palustrine Class: Emergent

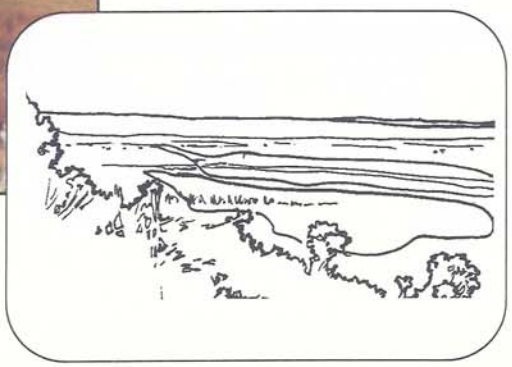
This wet meadow is typical of many found at high elevations in Utah. It can remain inundated, albeit shallowly, throughout the dry season, hence the palustrine classification. The wet meadow grasses cover the entire area, making the class emergent.

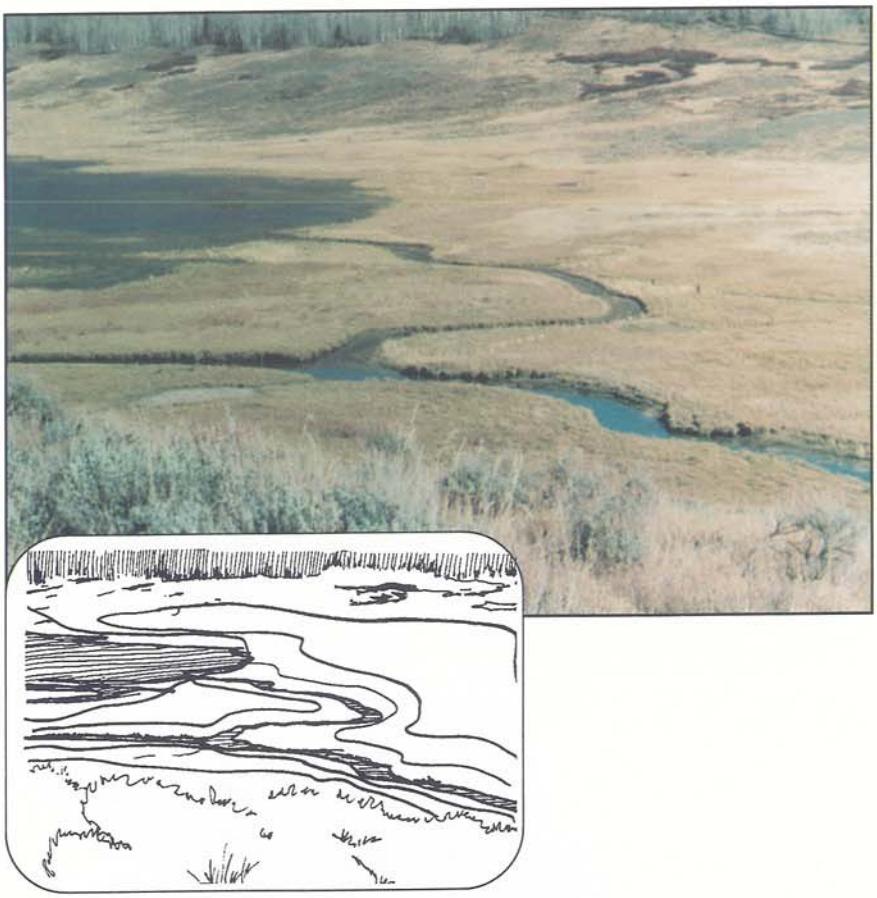


(1) System: Palustrine Class: Emergent

(2) System: Riverine Subsystem: Lower perennial Class: Unconsolidated bottom

Two wetland systems are present in this photograph. The channel in the center indicates the presence of a riverine system. The saturated meadow adjacent to the river in the foreground is a palustrine system. The valley gradient is low and the water appears to move through the channel in a slow meander. Thus, the riverine subsystem is lower perennial. It appears the bottom of the river channel is sandy, making its class unconsolidated bottom. The palustrine system has no subsystem, however, its class is emergent. This is because the reddish vegetation in the foreground cover more than 30% of the palustrine area.



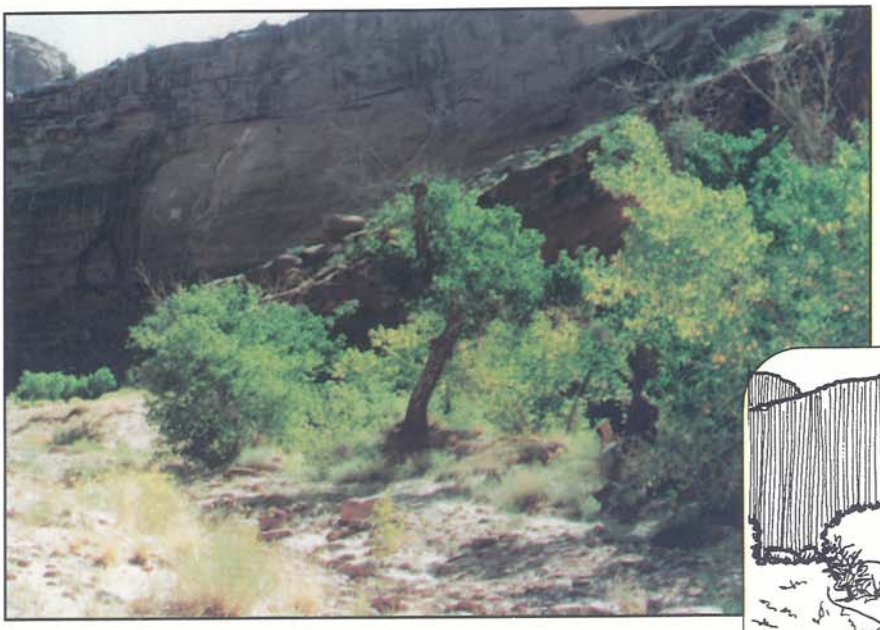


(1) System: Palustrine Class: Emergent

(2) System: Riverine Subsystem: Lower perennial Class: Unconsolidated bottom

(3) System: Lacustrine Subsystem: Littoral Class: Unconsolidated bottom

All three wetland systems are present in this photograph. The riverine wetlands are located in the channels in the center of the photograph. The palustrine wetlands are the wet meadows surrounding the river channel. The lacustrine wetlands are located in the upper left of the photograph and refer to the open water of the lake. The meanders of the river indicate a low gradient which means the riverine subsystem is lower perennial. Since there are no rocks or vegetation in the channel, we can assume the class is unconsolidated bottom. Grasses dominate the palustrine wetlands making their class emergent. The portion of the lacustrine wetlands seen in the photograph are shallow which makes the subsystem littoral. Since there is no rock, shoreline, or emergent vegetation along the lake margins, we can assume the class is unconsolidated bottom.



System: Riverine Subsystem: Intermittent Class: Streambed

This dry wash may not look like a wetland, but can still be classified under the Cowardin scheme. The presence of the channel indicates a riverine system. The channel is periodically flooded during certain seasons of the year, making the subsystem intermittent. The only class designation for intermittent subsystems is streambed.

LAWS AND POLICIES

Wetlands regulation has a long, convoluted history. Over the years, many federal and state laws have been passed concerning wetlands use, conservation, and protection. The meaning of these laws often changes with each new court case and legal interpretation. Numerous policies and executive orders have also been implemented which directly address wetlands management. In addition, social climate and popular sentiment has directed federal policy to change from a mandate of draining wetlands for development in the early 1900's to the present policy of preserving wetlands for a goal of "no net loss." The result of all this is often confusion; what regulations exist, what agencies enforce them, and where do they get their authority?

Becoming familiar with wetlands law is important to many interest groups. Real estate, agricultural, and business interests should be concerned because many activities in wetlands cannot continue until the proper federal or state permits are acquired. Land use managers need to know what activities are allowed in wetlands and what authorities direct those activities. Citizen's action groups should also be aware of the laws in order to be more effective in their conservation and protection efforts.

There are two main laws which regulate activities in Utah's wetlands. These are the Federal Clean Water Act, administered jointly by the U.S Army Corps of Engineers and the U.S. Environmental Protection Agency, and the State Stream Alteration Act, administered by the state office of the Division of Water Rights. Anytime a person wishes to make changes to a wetland or river in Utah, either by filling it or impeding its flow, he/she must obtain a permit from the Corps of Engineers or Division of Water Rights. This process is explained more fully in Chapter 5. However, in this chapter we discuss all laws, policies and agencies involved in wetlands regulation.

Following is a partial list of the regulations, laws, and policies concerning wetlands. Each is summarized to give an indication of the type of authority exerted.

Major Regulatory Statutes

Clean Water Act (1977) – This is the main federal law regulating activities in Utah's wetlands. It is administered jointly by the U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (COE). The Clean Water Act was formerly known as the Federal Water Pollution Control Act (FWPCA) and was originally created to address the problem of water pollution. It gave the EPA the authority to issue permits for the discharge of pollutants into waters of the United States. FWPCA has undergone several amendments since its passage in 1972 and is now known as the Clean Water Act. Section 404 of the Clean Water Act gives a special authority to the COE to issue permits specifically for the discharge of dredge or fill mate-

Regulatory laws, policies, and agencies

CHAPTER 4

The main objective of the Clean Water Act is to regulate the discharge of pollutants (such as sewage, toxins, soil, and wood) into U.S. streams and wetlands. The authority to do so is divided between the EPA and COE.

rial into waters of the United States. The main objective of the Clean Water Act is to regulate the discharge of pollutants (such as sewage, toxins, soil, and wood) into U.S. streams and wetlands. The authority to do so is divided between the EPA and COE, but the bulk of the permitting responsibility is up to the COE.

Stream Alteration Act – The Stream Alteration Act was originally passed in 1953 and most recently amended in 1992. This law gives the state office of the Division of Water Rights the authority to regulate activities in Utah's streams. The Stream Alteration Act states that a written permit is required of any agency, county, city, corporation, or person wishing to change the course, current, or cross-section of a stream channel in the state of Utah. Frequently, stream alteration activities require a Clean Water Act Section 404 permit as well as a Stream Alteration permit. Rather than file two separate applications, applicants can now file one joint applicatoin which is evaluated by both agencies. Both the COE and the Division of Water Rights look at the application and decide what permits are necessary. The COE has also given the Division of Water Rights a special authority to regulate the discharge of dredge and fill materials into Utah streams under something called a General Permit. The General Permit (GP-40) expedites the permitting process by allowing applicants to receive approval for their proposed activities quickly, provided that those activities comply with a set of conditions prescribed by GP-40.

Related Laws and Policies

Rivers and Harbors Act (1899) – The River and Harbors Act was the first to give the Army Corps of Engineers (COE) the authority to regulate activities in wetlands. As it was passed intially, the Act directed the COE to oversee the construction of any dam, levee, bridge, etc. in waters of the United States to ensure navigability of the waterway. In the 1960's this law was reinterpreted to include wetlands protection. The COE was given an ecological authority through a Memorandum of Agreement (MOA) with the Department of the Interior in the 1960's. In the MOA, the COE agreed to consider the ecological effects of construction activities in addition to its existing concerns. This marked the beginning of federal wetlands protection measures.

Executive Order 11988: Floodplain Management (1977) –The purpose of this order was to avoid direct or indirect federal support of new construction on river floodplains. In accordance with the executive order, the government will not subsidize construction activities in a floodplain if an alternative site is available for development. If no practicable alternative exists, the order calls for careful planning and requires a public comment period before construction begins.

Executive Order 11990: Protection of Wetlands (1977) – The objective of this order was to stop the destruction and modification of wetlands and to avoid new construction in wetlands. The order calls for interagency coordination of wetlands management. The goal of this cooperation is to maximize benefits derived from wetlands. Management should seek to maintain natural systems by conserving species and habitat diversity as well as fish, wildlife, timber, food and fiber resources. The order also calls for maintaining good water quality by monitoring pollution and erosion.

Emergency Wetlands Resource Act (1986) – The objective of this Act was to promote the conservation of wetlands in the United States. Specifically, it encourages private interests to cooperate with local, state, and federal governments to manage and conserve wetlands. It also calls for intensifying wetlands protection efforts through acquisition, easements or other methods by both public and private sectors. One goal of these efforts is to fulfill migratory bird treaties and conventions. To this end, the Act authorizes entrance fees at certain bird refuges to provide revenue for refuge operations. It also requires that a National Wetlands Priority Conservation Plan (NWPCP) be implemented which would prioritize wetlands for state and federal acquisition. In addition, the Act also directs the FWS to continue inventorying wetlands within the US through the National Wetlands Inventory project (NWI).

Regulation and Conservation:

The Role of the Agency

Wetland regulation and conservation is a cooperative effort between many agencies. The organization most responsible for regulation in Utah is the federal office of the U.S. Army Corps of Engineers. Other agencies involved with wetland regulation are:

- U.S. Environmental Protection Agency
- Utah Division of Water Quality
- Utah Division of Water Rights

Agencies involved in wetland conservation and protection are:

- U.S. Soil Conservation Service
- U.S. Agricultural Stabilization Conservation Service
- U.S. Fish and Wildlife Service
- U.S. Forest Service
- U.S. Bureau of Land Management
- Utah Division of Wildlife Resources
- Utah Division of Sovereign Lands and Forestry

Waters of the United States include special aquatic sites which possess special ecological characteristics of productivity, habitat, wildlife protection, or other easily disrupted ecological values.

The Division of Water Rights cannot issue a permit if the activity involves (a) a wetland, (b) bulldozing the stream channel, (c) actual relocation of the stream channel, or (d) a threatened or endangered wildlife or plant species.

Each of these agencies has a different responsibility and objective. Following is a brief description of each agency's role in wetlands regulation and conservation.

U.S. Army Corps of Engineers (COE) – The COE has the power to regulate any discharge of fill or dredged material into waters of the United States, including wetlands under Section 404 of the Clean Water Act. Section 404 divides the duties of wetland regulation between the COE and the Environmental Protection Agency, but gives the COE the responsiblity of permitting. That is, any time a person wants to alter a water of the United States either by discharging fill dirt or dredged material into it or by building a structure that impedes its flow or by modifying a stream channel, he/she needs to obtain a permit from the COE. Section 404 permits refer specifically to the discharge of dredge and fill material and are usually required in wetlands development situations. Waters of the United States include special aquatic sites which possess special ecological characteristics of productivity, habitat, wildlife protection, or other easily disrupted ecological values.

Environmental Protection Agency (EPA) – The legally defined role of the EPA is to provide the guidelines which the COE uses in its wetlands determinations and permitting. EPA can also review and veto any 404 permits issued by the COE. So while the permitting is up to the COE, ultimate authority lies with the EPA. EPA can also identify certain areas as "special cases." In such an instance, EPA does the wetlands determination, not the COE. The EPA's authority is administered out of its Office of Wetlands Protection, which was created in 1986. The office infrequently uses its veto and determination authorities. Both EPA and COE are responsible for enforcing the wetland program, however, the bulk of the enforcement is usually up to the COE because of its active role in permitting.

Division of Water Quality – The Division of Water Quality issues the water quality certification part of Section 404 permit applications. The Division of Water Quality gets its authority from Section 401 of the Clean Water Act which requires that each individual state maintain its own jurisdiction over water quality. When the COE receives a Section 404 permit application, it must submit the application to the Division of Water Quality for water quality certification.

Utah Division of Water Rights – The Stream Alteration Act was passed by the Utah legislature in 1971 and amended in 1985. The Act is administered by the Division of Water Rights. The Division of Water Rights is the main agency involved in permitting stream course alteration. Individuals wishing to change the course, current, or cross-section of a stream channel must first file a written application with the State Engineer. The Division of Water Rights has also been given the authority by the COE to regulate the discharge of dredge or fill into Utah streams. The authority comes in the form of a general permit (GP-40) issued to Water Rights by the COE. A general permit allows the

State Engineer (Division of Water Rights) to approve the discharge of dredge or fill material into a stream provided the activity complies with the GP-40 guidelines. The Division of Water Rights cannot issue a permit if the activity involves (a) a wetland, (b) bulldozing the stream channel, (c) actual relocation of the stream channel, or (d) a threatened or endangered wildlife or plant species. In these cases, the permit application must go through the COE. In all cases, the COE still has authority to oversee the project and can determine whether an individual permit would be more appropriate.

Soil Conservation Service (SCS) – The SCS is a familiar agency to most farmers. SCS provides technical assistance to farmers and assists them with many programs that encourage the establishment of wetland and wildlife habitat on private lands. Habitat can come in the form of vegetative filter strips, ponds, and artificially created wetlands. SCS's authority comes primarily from the Food Security Act passed in 1985. The Act contains a provision known as Swampbuster. Swampbuster denies eligibility for all USDA benefits to farmers who convert natural wetlands to croplands after December 23, 1985. SCS can make wetland determinations and determine whether a wetland is or was present. SCS can then evaluate the situation to determine where violations have occurred and whether to deny benefits.

Until recently, SCS had no authority to make wetlands determinations for the Section 404 permit program. In the past, SCS could make wetlands determinations only for farm benefit programs. Such determinations were irrelevant to the COE, which would make its own wetland determinations for the 404 permit program. However, as of 1994, the COE must now accept determinations made by SCS on agricultural lands for the Section 404 permit program.

Agricultural Stabilization Service (ASCS) – The role of ASCS in wetlands conservation is similar to that of the SCS. ASCS administers many cost-share programs with farmers, several of which directly pertain to wetlands. Through programs such as the Wetlands Reserve Program (WRP) and the Water Quality Incentive Projects (WQIP), farmers receive money annually from the USDA for developing and implementing water quality and wetlands restoration plans. ASCS administers the funding and can deny payment if violations are committed.

Fish and Wildlife Service (FWS) – The FWS's main contribution to wetlands conservation and protection is in the form of commenting on land use activities and permits. Whenever an action is proposed for water related development, the FWS must be consulted first to determine potential damage and loss of wildlife habitat. The FWS reviews plans for the proposed activity, rates the area for habitat value, then determines whether there would be a significant impact to wildlife. Although the FWS provides com-

The FWS reviews plans for the proposed activity, rates the area for habitat value, then determines whether there would be a significant impact to wildlife.

The official policy of the DWR is to recognize wetland ecosystems as critical to wildlife, develop long-range regional plans for wetlands management, and acquire or lease wetlands to maintain and protect them for the purpose of wildlife use.

mentary, it does not have the authority to regulate wetlands unless a threatened or endangered species is present at a particular site.

Forest Service (FS) – The FS plays a similar role in wetlands conservation through their Stewardship Incentive Program (SIP). This program provides financial assistance to private landowners for following prescribed conservation practices on their land. There are eight approved plans, four of which directly pertain to riparian and wetlands protection and enhancement. Like any of the other federally funded projects, SIP is subject to revocation in the event of a violation. The FS is also under federal mandate to develop watershed management plans for each national forest. These plans must include riparian and floodplain management guildelines as well as a wetlands protection policy. The FS must comply with the Clean Water Act (CWA) and National Environmental Policy Act (NEPA) in the administration of land under its jurisdiction.

Bureau of Land Management (BLM) – Like the FS, the BLM is under a federal directive to manage wetland and riparian habitat on public lands. The BLM must provide land use plans which include riparian and wetland protection measures. Riparian and wetland areas are monitored to ensure that plan objectives are sufficiently met. The BLM will not permit any activities which may conflict with plan objectives. If a permit is issued, the permittee must comply with plan objectives or be subject to enforcement of those objectives in some way.

Utah Division of Wildlife Resources (DWR) – The DWR was created to manage and protect wildlife throughout the state of Utah. Wetlands conservation is mainly accomplished through protecting wildlife habitat. The official policy of the DWR is to recognize wetland ecosystems as critical to wildlife, develop long-range regional plans for wetlands management, and acquire or lease wetlands to maintain and protect them for the purpose of wildlife use. DWR enforces all state laws pertaining to wetlands and alerts the COE of any suspected violations of federal law. An interagency task force, of which DWR is a part, is currently preparing a statewide policy regarding the protection and use of wetlands in Utah.

Division of Sovereign Lands and Forestry (SLF) – The Division of Sovereign Lands and Forestry controls and manages school trust and sovereign lands lying below the water's edge of the Great Salt, Utah, and Bear Lakes as well as the Jordan, Bear, Colorado, and Green Rivers (surveyed at the time of statehood). Much of this land is riparian or wetland. SLF has no specific authority to regulate activities in these areas unless the area is deemed a sensitive area, in which case specific management guidelines must be followed. SLF does have some specific authority with respect to lands around the Great Salt Lake. Utah Code 65-8a authorizes Sovereign Lands to promote water quality of the Great Salt Lake tributaries, maintain the lake and marshes important to waterfowl, and maintain and protect state, federal and private marshlands, rookeries, and refuges.

The Section 404 Permitting Process

CHAPTER 5

Wetlands are valuable resources to humans and wildlife alike. Impacts to wetlands are often irreversible. For these reasons, the federal government now requires that a permit be obtained before conducting certain activities in wetlands. These permits are called Section 404 permits and are administered by the U.S. Army Corps of Engineers (COE).

When is a permit required?

Any activity conducted in a wetland which involves the discharge of dredge or fill material into the wetland requires a permit. Activities which may require a Section 404 permit include, but are not limited to:

- Filling a wetland with soil or other materials
- Constructing dams or impoundments
- Constructing permanent or temporary roads
- Replacing bridges or culverts
- Stabilizing stream banks with riprap or other materials
- Plugging drainage ditches
- Backfilling or cleaning irrigation ditches

Activities that would not require a permit would be those that do not involve discharge of dredge or fill material. These types of activities might include, but are not limited to:

- lowering groundwater levels
- flooding an area
- draining a flooded area
- cutting or removing vegetation above the ground that doesn't disturb root systems or redeposit excavated soil material

Dredge material can be sand, rock, dirt, soil, silt, or mud that has been removed from another waterbody such as lake, wetland, or river bottom. Fill material can be sand, soil, trees, rocks, wood, asphalt, garbage, old cars, or pilings. Using either fill or dredged material to change the physical nature of a wetland, low area, river, stream, ditch or other "waters of the United States" is considered a discharge and would require a Section 404 permit. This includes, without limitation, any addition or redeposit of dredged materials, including excavated materials, into waters of the U.S. which is incidental to any activity, including mechanized land clearing, ditching, channelization or other excavation which has or would have the effect of destroying or degrading any area of waters of the U.S.

Types of permits and the activities they authorize

The COE issues four types of permits to authorize projects in wetlands. The four types of Section 404 permits are:

Most common repair and maintenance projects fall under a nationwide, state, or regional permit.

- State
- Regional
- Nationwide
- Individual

State, regional, and nationwide permits are types of "general" permits. General permits were established to expedite the permitting process for projects which would have minor environmental impacts. Nationwide permits authorize activities on a nationwide basis. That is, certain types of dredge and fill activities are automatically authorized anywhere in the country, provided a nationwide permit has been granted for that activity. State and regional permits are similar to nationwide permits except they authorize activities for a particular state or region.

Most common repair and maintenance projects fall under a nationwide, state, or regional permit. For example, if you wish to replace a culvert or other structure that was taken out by a flood, this activity is covered by a nationwide permit.

Obtaining a nationwide permit is relatively simple. You fill out an application for a Section 404 permit, submit it to the COE, and they review it. Once the COE determines the activity is covered by a nationwide permit, your project will be authorized, provided the environmental impacts are minimal.

NATIONWIDE

There are 40 types of activities which are covered under nationwide permits. Activities such as utility line backfilling, bank stabilization, placement of fill for road crossings, minor discharges, maintenance dredging, temporary cofferdam and boat ramp construction, and wetland creation and restoration are all covered by nationwide permits.

INDIVIDUAL

Individual permits are required for specific activities that could result in large environmental impacts. These types of activities cannot be covered by state, regional, or nationwide permits. In an individual permit situation, the public is notified of the proposed activity and allowed to comment. Various natural resource agencies, such as the U.S. Fish and Wildlife Service and Utah Division of Wildlife Resources are brought into the review process. The objective of this process is to develop an environmentally sound plan while still meeting the needs of the applicant. Obtaining an individual permit is the most time-consuming and can last anywhere from four to six months.

If in doubt, check it out.

The term "individual" is confusing because it implies that this type of permit is for single applicants. However, individual refers to the status of the activity not the applicant! An individual permit is necessary if the proposed activity does not fall under a general permit category and must be evaluated individually. Therefore, individual permits are often granted to large corporations and agencies, not just individual citizens.

Completing the application

The Section 404 permit can be obtained from the Regulatory Office of the COE located in Bountiful, Utah. Recently, the permit application underwent revision and is now a joint application. The new application includes a stream alteration section. The application was amended because so many projects require both a Section 404 and stream alteration permit. Stream alteration permits are administered by the state office of the Division of Water Rights. In the past, applicants were required to fill out two separate applications at the two different agencies. Now applicants need only complete one application and submit it to either office.

The application asks for a brief description of the proposed project, its purpose, an estimate of the wetland acreage to be impacted, the amount of dredge or fill material that will be discharged, and the project location. If the COE feels you have given insufficient information, it will return your application asking for the missing items. The COE will continue to do this until you have submitted a satisfactory application which allows effective evaluation of the project. Working closely with the COE from start to finish will ensure all issues of concern are properly addressed.

It is a good idea to submit an additional report with the application. The report should include:

- Project description, purpose, and need
- Project start and completion dates
- Existing environmental conditions such as vegetation, soils, hydrology, acreage
- Type and estimated area of impact
- Map of project area
- Schematic of project design, plan
- Proposed mitigation plan

The more complete the initial application, the quicker it will be reviewed. However, satisfactory completion of the application does not guarantee that you will receive a permit. This is why it is suggested that you work closely with the COE from the beginning.

MITIGATION

The Section 404 permit cannot be issued unless impacts from the proposed activity are lessened to the maximum practicable extent. This is known as mitigation. You will be required to submit a mitigation plan as part of your application. There are three types of mitigation:

Avoidance Avoid any impact at all by finding an alternative, non-wetland site in which to conduct your project. The COE requires that you attempt to find an

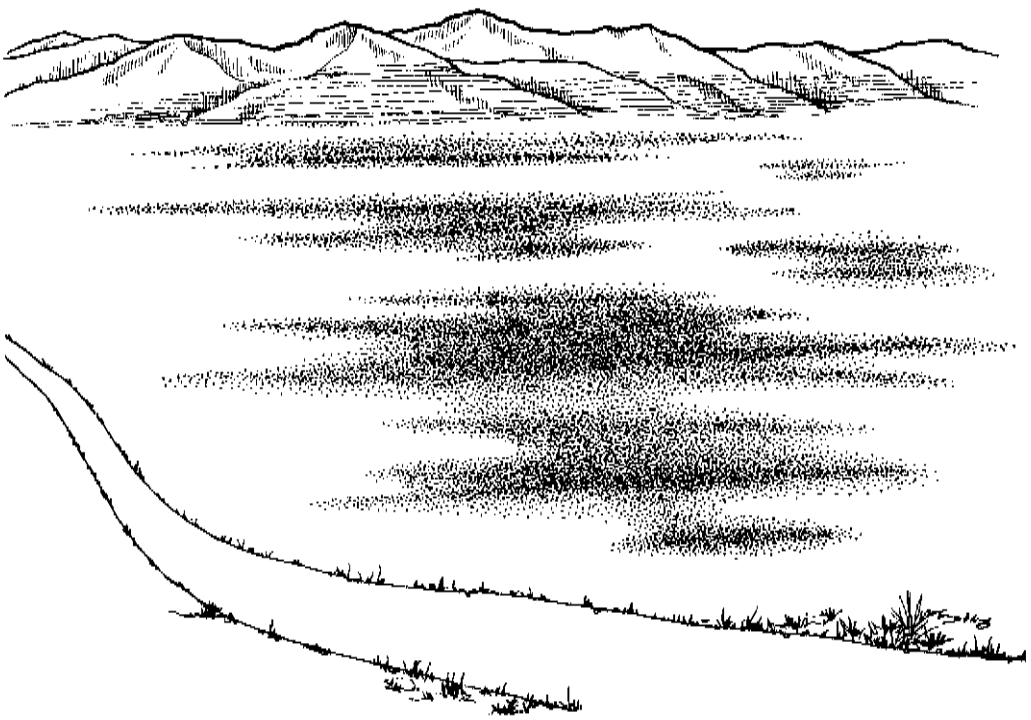
Mitigation sequencing includes: AVOIDING wetlands, MINIMIZING impacts to wetlands or COMPENSATING for unavoidable losses to wetlands...in that order.

...if you are constructing an office complex, cluster the buildings in one area rather than spreading them out across the entire wetland.

alternative non-wetland site before you can be given a Section 404 permit. If you feel you have no other alternative than to fill the wetland, you will have to adequately prove to the COE that no practicable alternative sites exist.

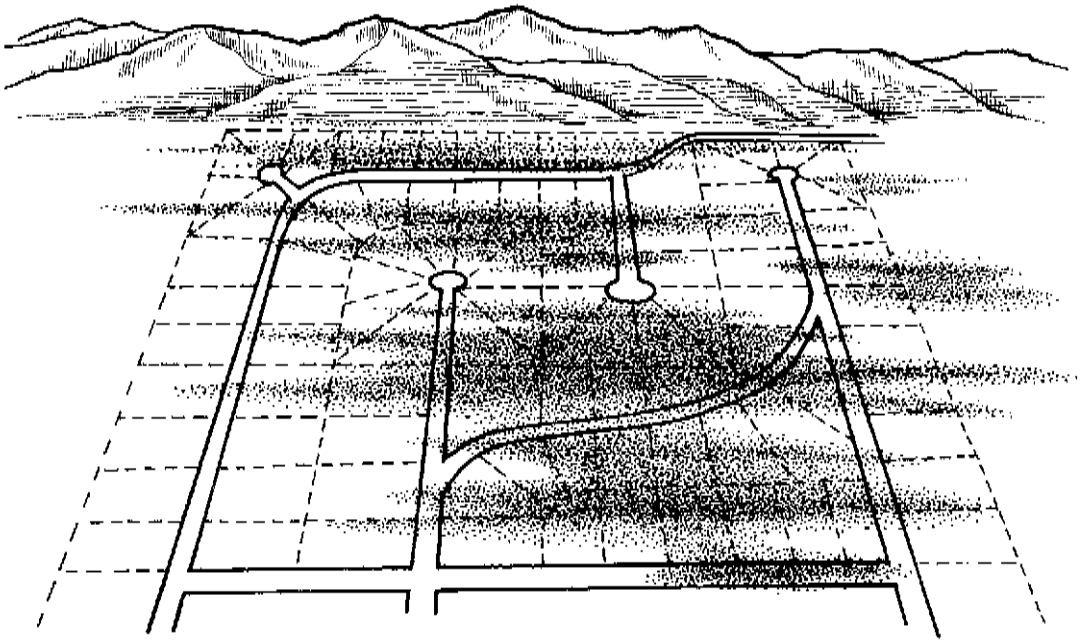
Minimization If you adequately show you have no alternative site and must conduct your activity in a wetland, the COE requires that you minimize the wetland area impacted through project design. For example, if you are constructing an office complex, cluster the buildings in one area rather than spreading them out across the entire wetland. You will only need to fill the area required for the cluster. In this way, the total wetland area impacted is minimized.

Compensation Compensation is required for unavoidable adverse impacts after all appropriate and practicable avoidance and minimization measures have been taken. You will need to compensate for the total wetland area impacted by your project. Compensation can be either in-kind or out-of-kind and on-site or off-site. In-kind compensatory mitigation is the replacement of the same wetland function or value lost during project development. Out-of-kind compensatory mitigation is the replacement of a different type of function or value lost during project development. On-site means the mitigation action takes place in the same general area as the impact and off-site means the mitigation action is taken elsewhere. In-kind, on-site mitigation is the preferred alternative. In-kind, on-site mitigation is favored because site conditions usually assure suc-



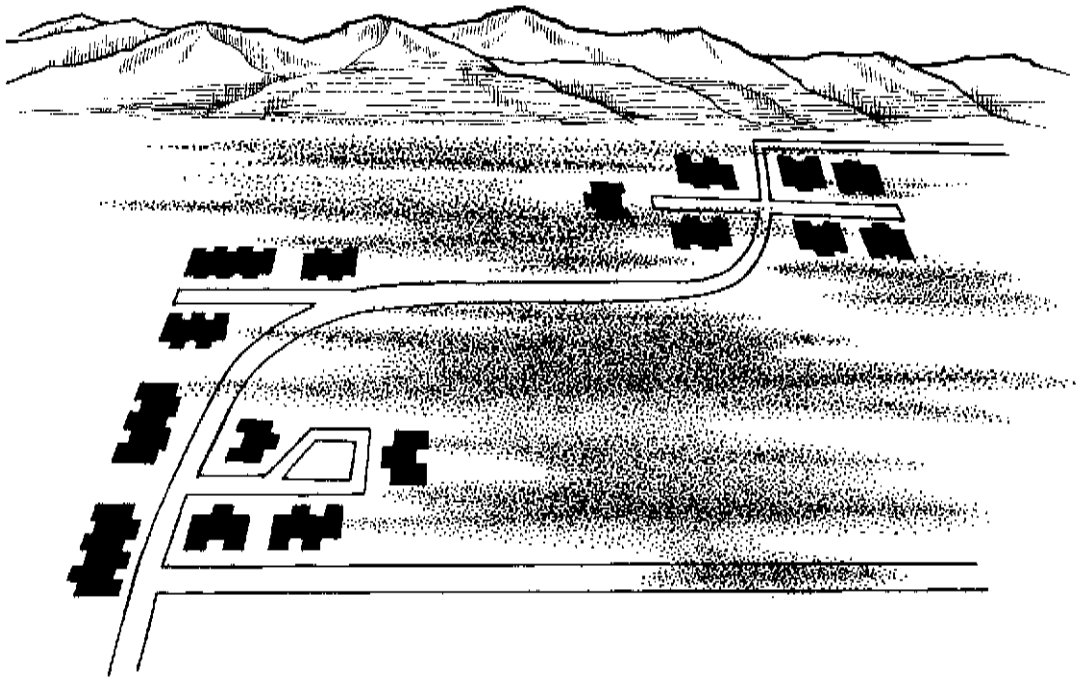
This picture illustrates one method of avoidance. Rather than build the road directly through the wetland, this applicant decided to avoid the wetland by building the road around it. When planning a project, the U.S. Army Corps of Engineers requires that you first must look at AVOIDING the wetland by conducting your activity in a non-wetland area.

Poor Planning



If you cannot avoid the wetland, then the Corps requires that you MINIMIZE the impacts to the wetland. High density development and wetlands don't mix well. City/county planners and zoners should identify wetlands and other sensitive areas when subdividing. Subdivisions should be planned to avoid development in sensitive areas. Developers should be encouraged to cluster developments that avoid or minimize impacts to wetlands. The top picture illustrates how many subdivisions are currently designed, resulting in a maximum destruction of wetland acreage and values. The bottom picture illustrates a better design that allows for about the same development, yet minimizes destruction of wetlands, creates new wetlands to compensate for unavoidable wetland losses, and gives the new residents open space, aesthetic, and recreational values.

Minimizing Impacts with Cluster Design



The goal of mitigation is a no net loss of wetland acreage.

cessful implementation/restoration of wetland functions and values. In in-kind, on-site compensation, the COE requires a 1:1 mitigation ratio. That is, for every one acre or unit of wetland value lost, one acre or unit of value must be replaced. Off-site, out-of-kind compensation will require more acreage replaced than initially lost. This is because this type of compensation is not viewed as an equivalent replacement. Compensatory mitigation can be extremely costly to the applicant.

The goal of mitigation is a no net loss of wetland acreage. The mitigation sequence of avoidance, minimization, and compensation ensures attainment of this goal. Compensation can be in the form of restoration, enhancement, or creation (see Chapter 6).

Mitigation banking

The concept of mitigation banking is relatively new in Utah. Mitigation banking can be defined much like an ordinary bank account. A person does not withdraw or deposit money, however, he deals with "mitigation credits." For example, a developer knows that through planned projects, fish and wildlife habitat will be destroyed and he will have to compensate for these losses. He also knows that, in all likelihood, some off-site compensatory mitigation will be the only viable option to mitigate for the losses.

In anticipation of these events, he seeks out an additional area where he can create, restore or preserve habitat. This mitigation site is then acquired and developed into a viable habitat area with a pre-determined number of credits available. In this way, he creates a mitigation bank account for himself. He can withdraw credits from this account when he is required to compensate for a loss elsewhere. Withdrawals can be made as long as mitigation credits are available and project and mitigation plans are approved.

The "bankers" are regulatory and planning agencies who oversee banking activites in a region. These agencies are the ones who determine how many credits a person can receive for his habitat restoration efforts. At the mitigation banking site, the appropriate regulatory agency assesses what benefits fish and wildlife will receive from the developer's efforts and determines how many credits those benefits would be worth. Likewise, when the developer goes to withdraw credits, the banker determines how many credits worth of damage was done at the impact site. The developer must then withdraw this number of credits from his acount to effectively mitigate for the losses incurred. Recall, however, that off-site, out-of-kind is the least favored form of compensatory mitigation. The bankers will most likely require more acreage replaced than initially lost in these situations.

Mitigation banking has its costs and benefits. It provides a simple and effective way for agencies and developers to comply with mitigation requirements. It is good when compensating for small, isolated losses, especially when on-site mitigation is impossible. It also allows for the consoli-

dation of mitigation efforts. This results in an unfragmented habitat complex which is better for wildlife than a number of small, disconnected sites. However, there are many damaging aspects of mitigation banking. Species may be lost which cannot be compensated for in off-site mitigation. It may also result in a net-loss of habitat in the event of creation or restoration failure. Therefore, mitigation banking should be used judiciously and with caution. It should be a last resort when no alternative solution (such as avoidance) is available.

Mitigation banking is becoming a reality in Utah. Several municipalities, state agencies, and private entities are examining options for mitigating unavoidable losses in wetlands. Federal agencies are attempting to make money available for establishing mitigation banks by working with state and local interests to develop watershed plans. The COE can expedite the 404 permitting process in areas where a watershed plan has been developed and approved.

Other innovative avenues being pursued to expedite the permitting process are Wetlands Advanced Identification Study (WAIDS) and Special Area Management Plans (SAMP). Both help to determine wetlands resources in an area before impacts are made.

The SAMP is a formal process in which specific judgments are made regarding wetlands classification and mitigation measures. Some may even include the issuance of a general permit for fills, identified in the document.

Keys to developing a mitigation plan or developing a mitigation bank include starting the process early, involving all concerned parties, and maintaining an open line of communication with decision makers.

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Creation, restoration, and enhancement

CHAPTER 6

In this chapter, we will discuss things you'll need to consider when planning and designing a wetlands restoration, creation, or enhancement project. Mitigation may not be the only reason to learn about the process. You may want to build a pond on your property for wildlife or you may be interested in restoring a degraded marsh in your community. Any one of these reasons requires an overall objective, a good plan, and an adequate knowledge of wetlands functions and values. The first step is setting a goal: ***Will you be restoring or enhancing a previous wetland or creating an entirely new wetland?***

These activities require very different plans of action. You must also balance economic considerations with ecological viability. If you choose to restore or enhance a wetland, you must first assess whether the targeted site is suitable for reconstruction/enhancement. If you choose to create a new wetland, you must determine whether it will be able to function like a natural wetland in perpetuity. You must also consider which of these options will ensure the highest probability of success with the lowest amount of maintenance.

Restoration/Enhancement Generally, restored wetlands function better, are more self-sustaining, and cheaper than created wetlands. Restoration can entail rehabilitating a degraded wetland or an area with hydric soils which was previously drained or filled. It is best to choose a degraded wetland that is part of a larger complex of existing wetlands. In these situations, wetland soil and hydrologic conditions are already present. Because of this, restoring wetland functioning is often just a matter of reflooding and replanting the area.

Creation Created wetlands often function less successfully than restored wetlands. Wetland creation is defined as the conversion of a non-wetland (where wetland conditions never existed) to a wetland. The success of created wetlands is minimal because the requisite wetland soil and hydrologic conditions are absent from the site initially. These conditions set the stage for wetland functioning and are difficult to replace artificially. Creating a functionally well-built wetland is not easy. *Merely filling a depression in the ground with water will not create a wetland!* Other components, such as drainage pattern, surrounding topography, and water budget need to be considered. **The three major steps involved in wetland creation and restoration are:**

1. **Defining a priority objective** Prioritize your cost and design objectives. Do you want a low or no maintenance system? Will you be able to afford to hire a manager to ensure long-term success? What should the wetland's main function be: wildlife habitat, water retention, water treatment, sediment retention, or flood conveyance? The objectives you choose will affect your work plan and design.

2. **Inventory past and present resources** Before you can design a work plan you will need to gather as much information as possible about the living and nonliving

...if you wish to create a wetland for the purpose of providing wildlife habitat, choose the types of animals and species you want to attract; select the types of plants suited for the region's climate and rainfall...

resources in the targeted area. If the area was a previous wetland:

- What were the conditions before the site was disturbed?
- Was it a seasonally or permanently flooded wetland?
- Was it a marsh or meadow?
- What types of plants grew there?
- What types of animals lived there?
- What kinds of soils were present?
- Where were the hydric soil boundaries?
- How permeable was the soil?
- What was the site's slope and elevation?
- Are there wetlands nearby; how far and how connected?
- What were past and existing drainage systems?
- What was the drainage area and water storage capacity of the site?

If you are creating a new wetland you will also need to ask similar questions regarding soils, slope, elevation, vegetation, and wildlife communities. The sources available to you to obtain this information are:

- USGS topographic maps
- Aerial photographs
- Water quality data
- Engineering and topographic surveys
- Fish and wildlife habitat surveys
- SCS soil surveys

Most of these are available through public land management agencies such as the Bureau of Land Management, Soil Conservation Service, Fish and Wildlife Service, Utah Automated Geographic Reference Center (AGRC), Utah Division of Wildlife Resources, and Utah Division of Water Quality. This information is essential to designing an effective and successful wetlands project.

3. **Developing a work plan** To develop an effective wetlands work plan, you must:

- Clearly identify an objective
- Consider site characteristics and limitations
- Balance economy and ecology
- Include some method of monitoring success or failure

For example, if you wish to create a wetland for the purpose of providing wildlife habitat, choose the types of animals and species you want to attract; select the types of plants suited for the region's climate and rainfall; periodically drain and flood the area, if necessary, as dictated by season, soil type, topography, and water rights; and schedule wildlife surveys during appropriate times of the year (e.g., spring) to monitor population fluctuations and assess whether your target goal has been reached.

Selecting an appropriate site

Often the most difficult part of designing a wetland project is finding an appropriate site. This can be especially hard along the Wasatch Front where the undeveloped land base is shrinking rapidly. Combine this with natural limitations such as water availability, topography, and localized climate and you find that suitable mitigation sites are few and far between. Some factors you need to consider when choosing a site are:

1. **Land ownership and water rights** Investigating the land ownership, existing easements, rights-of-way, and water rights of an area is important. The site you are interested in buying may be superficially ideal for wetlands restoration, but you must consider conditions in surrounding lands as well. If you purchase the land, will the water rights come with it? If so, what are the conditions of the rights? Are water rights available to be purchased? Will your desired objectives be consistent with the state water laws of "beneficial use"? Will property owners be willing to sell at a fair price? Are there any easements or rights-of-way that may interfere with your design? Will surrounding activities, such as agricultural or stormdrain run-off, affect your water quality? Are there high voltage lines that may result in bird wire-strike mortality? What are the subsurface mineral rights, if any, on the property? Will your proposed activity be consistent with local planning goals and zoning ordinances? Factors such as these and others must be weighed in order to assess the potential success of the project.

In general, water rights agreements can be complicated and well protected. To protect your investment and ensure a successful outcome, be as informed as possible about historic and present day agreements.

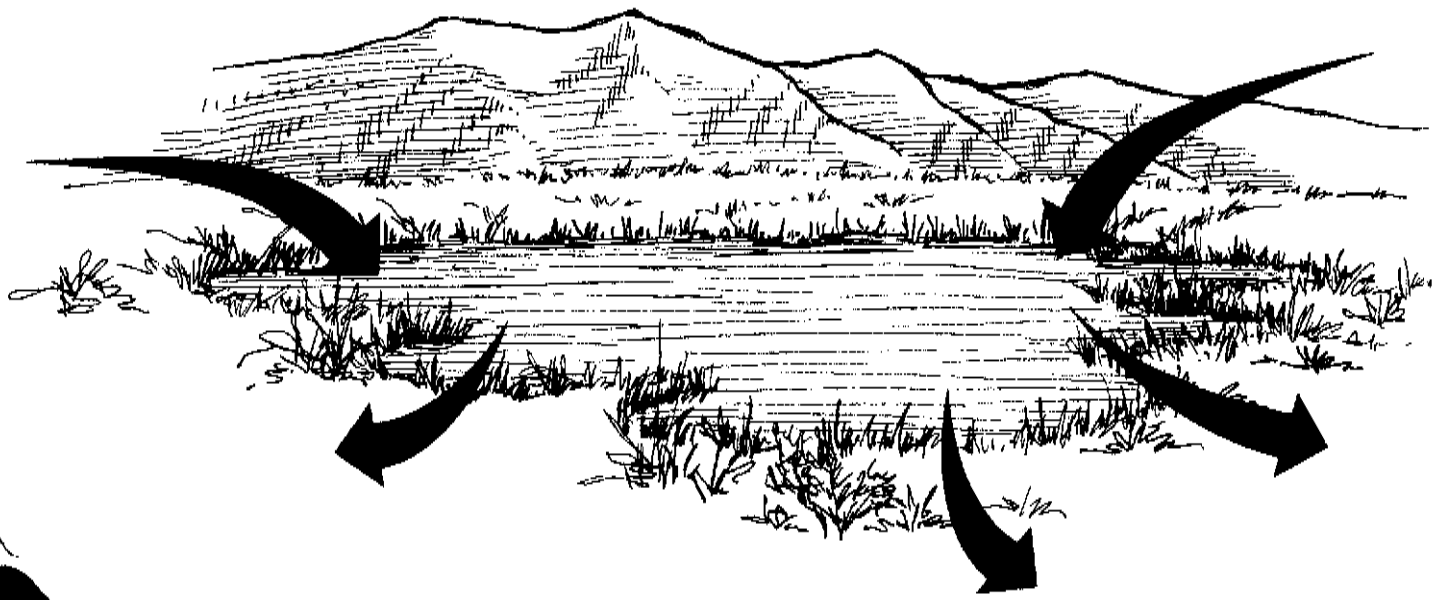
2. **Hydrology** To understand the hydrology of a site, you must consider the *water budget, hydroperiod, and flow characteristics* within the wetland. The water budget is the change in water stored over time. It is expressed as a function of the rate of water leaving the wetland subtracted from the rate of water entering the wetland. More simply, to maintain a constant water level in the wetland you must balance water entering and leaving the wetland. Water can enter a wetland through rainfall, storm water runoff, groundwater discharge, or by active pumping. Water can exit the wetland through evaporation, plant transpiration, stormwater outflow, groundwater recharge, or by active pumping. Before purchasing a site, you (or someone else) must calculate a water budget for it. Then you must determine what specific conditions (e.g., seasonal increases in rainfall, groundwater elevations) will necessitate adjusting the budget and at what times of the year. You must ask yourself if maintaining the budget at the site will be economically and ecologically feasible.

To protect your investment and ensure a successful outcome, be as informed as possible about historic and present day agreements.

The **hydroperiod** of a wetland is the seasonal variation in water availablity and storage. You can determine the hydroperiod of a wetland when you calculate the water budget. Conversely, analyzing the hydroperiod will allow you to manipulate the water budget as seasonally required. For example, during periods of high runoff you can control your inflow by building diversion structures above the wetland or by redirecting base flow around and beyond the wetland. When selecting a site, consider how viable any of these options will be. Ideally, the site should provide maximum flexibility to accommodate as great a range of environmental conditions as possible.

The **flow characteristics** of a wetland describe the movement, or flow, of water through the wetland. Two basic flow systems found in Utah wetlands are *riverine* (figure b) and *depressional* (figure a). *Depressional* flow systems generally have slow moving water which is retained in the system for a relatively long time. Riverine systems are more variable; flow characteristics change along the length of a stream, alternating between slow and fast depending on a particular reach. *Riverine* flows often vary considerably with season as well. Understanding the flow characteristics of a site is necessary in developing a wetland for a specific function. For example, if you want to create a wetland for the purpose of flood storage you would need to pick a site with depressional flow characteristics. In order to maintain a desired water level, you would need to gather information about the site's length, depth, drainage area, surface area, and volume. From these, you can calculate the site's flow

Two basic flow systems are found in Utah wetlands – riverine and depressional. (a) Depressional flow systems generally have slow moving water which is retained in the system for a relatively long time. If a wetland is being created for the purpose of flood storage, this would be the type of flow system to mimic. (b) Riverine flow systems are variable. The flow characteristics change along the length of the stream, alternating between slow and fast depending upon the characteristics of the reach and season.

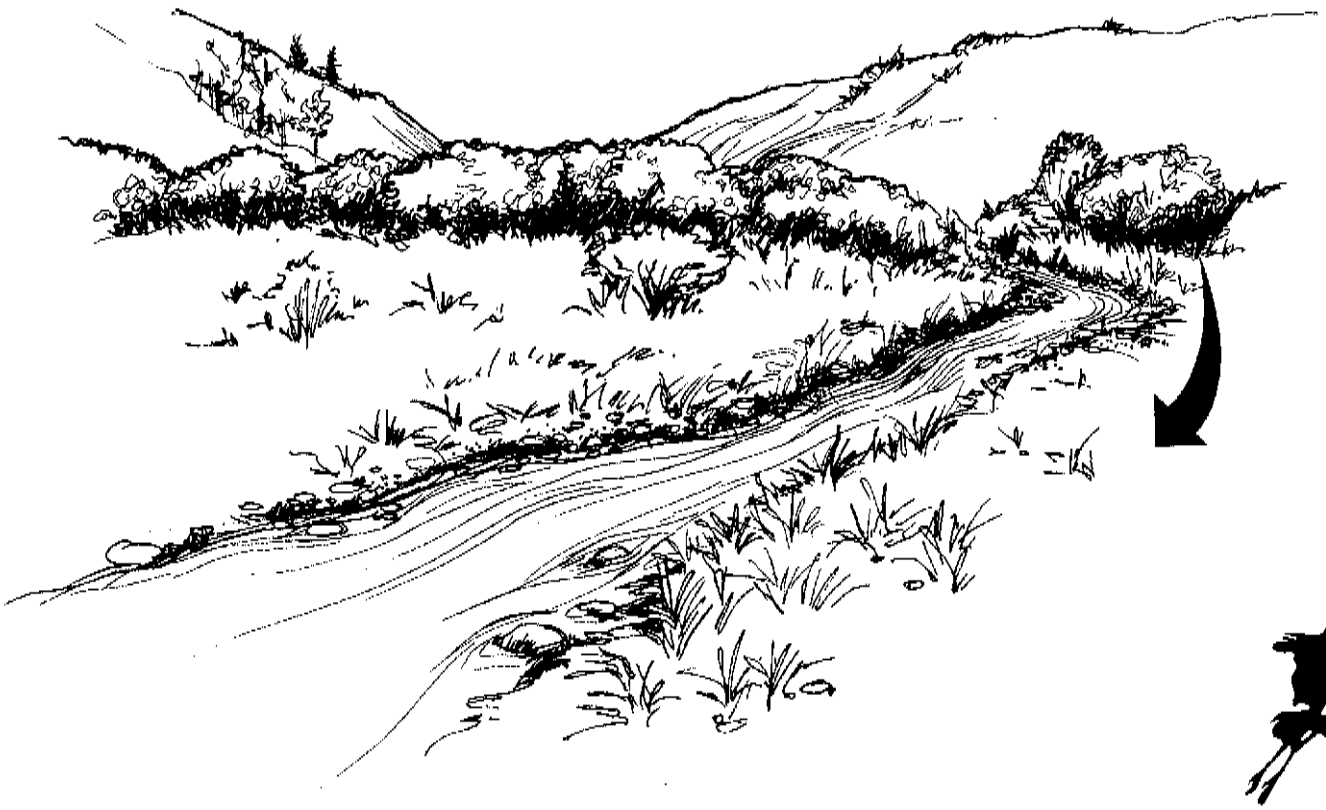


rate and retention time. You can use these to develop a plan to maintain water levels at various times of the year.

3. **Topography, geology, and soils** A site's elevation, soil, and slope characteristics are important for assessing construction costs, drainage patterns, and erosion potential. Most created and restored wetlands need to be on level ground. If the site you are interested in is not flat or level, what will the costs be to grade the area? Are there suitable areas for creating depressions or will you be impacting additional wetlands? Underlying rock formations are important as well. Shallow bedrock at a site can hinder excavation and be costly to remove. If there is shallow bedrock, what type? Can you remove it with standard earth moving equipment or will you need to blast the area? Is the soil highly permeable? Will you need to modify such soil to reduce its permeability and "seal" the wetlands bottom? Will surrounding topography influence erosion? Would extraneous structures be required to retain soils and reduce erosion? Would this be a costly and/or high maintenance operation? Such questions asked of a site may reduce the risk of wetlands failure and save you money.

You should obtain information regarding soils, erosion potential, the effects of topography and geology on drainage patterns, and the cost of correcting and maintaining such corrections at the site. This information will help you evaluate whether the site is appropriate for your objectives and budget.

The flow characteristics of a wetland describe the movement, or flow, of water through the wetland. Two basic flow systems found in Utah wetlands are riverine and depressional.



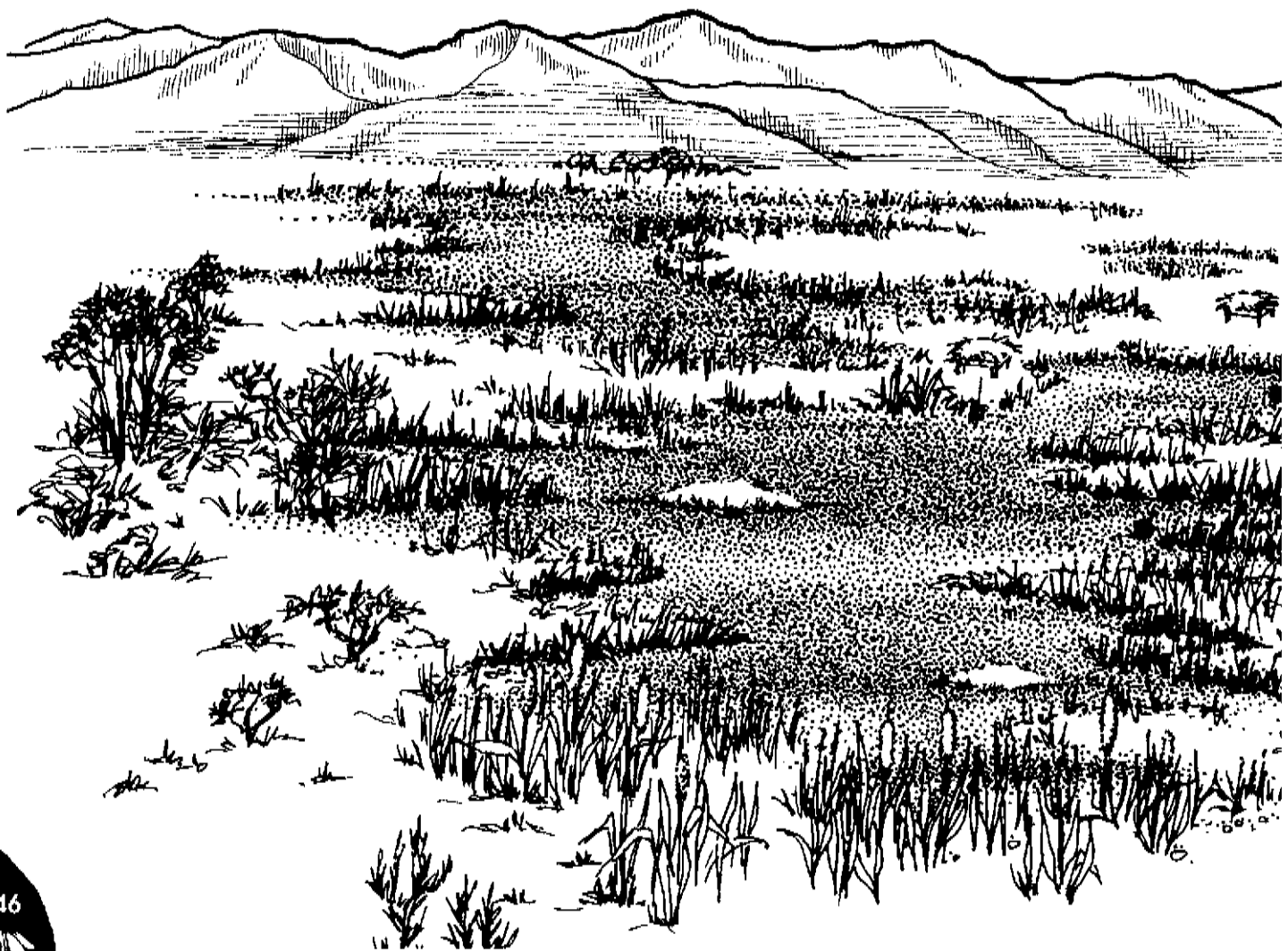
Wildlife can mean insects, fish, birds, and large mammals; habitat should provide feeding, breeding, and resting areas.

Other characteristics, such as climate and local biological community, should also be factored in when choosing an appropriate site. Climate can vary from region to region and site to site; plant communties can differ, depending on slope and elevation, within the same watershed. Average annual rainfall is different in Moab than it is in Logan. Maximum precipitation occurs at different times of the year in St. George and Vernal. Wetland plants of the southern region do not thrive in the north and vice versa. You must ask yourself what climatic and biological restraints will dictate your choice of site? Your functional objective and plan design must be able to work within the specific limitations of your chosen site.

Functional design for specific objectives

Once you have chosen a site you can begin to set your plan in motion. Remember to keep your plan as simple and manageable as possible. Recall that the first step in creation, restoration, and enhancement is to set a priority objective.

Existing wetlands can be enhanced for wildlife benefits. Planting vegetation to provide layers of cover and a variety of food sources, creating uneven shorelines, using vegetation to screen disturbances from use of a road or pathway, and developing nesting platforms and islands, are some of the ways that impacts can be mitigated.



Following is a list of some of the more common objectives for wetlands projects with specific planning and design considerations.

Wildlife habitat Providing wildlife habitat is a common goal of wetlands creation, restoration, and enhancement in Utah. Wildlife can mean insects, fish, birds, and large mammals; habitat should provide feeding, breeding, and resting areas. The area need not be large to be effective. Valuable wildlife habitat can be created on less than one acre. Wetlands created for the purpose of wildlife habitat should include:

- Upland islands for shorebird nesting and roosting which may provide potential protection from predators
- Low gradient shorelines to encourage plant growth and provide habitat for dabbling ducks
- Drawdown structures for managing water levels, plant invasions, and disease
- Deep permanent water areas for diving ducks and fish
- Connecting corridors to other wetlands and habitats
- Patches of different kinds of habitat, such as open water, grassy shores, and tall trees
- Nest boxes for kestrels, wood ducks, bluebirds, and bats
- Logs, debris, and vegetation on bottom for fish cover
- Shoreline variation/indentation to maximize area of edge habitat

Providing wildlife habitat is a common goal of wetlands creation, restoration, and enhancement in Utah.

Water treatment As mentioned in previous chapters, wetlands are natural water treatment plants. Sediment is filtered out as water moves through the wetland and harmful toxins are removed through plant uptake and chemical reactions. To design a wetland for the purpose of water treatment, you must:

- Connect a series of wetlands through active pumping or gravitational flow
- Eliminate stagnant areas and encourage flows between ponds
- Increase water retention time in the complex
- Spread the influent over as large an area as possible
- Include some means of monitoring sediment and toxin loads

If you decide to create a wetlands for the purpose of improving water quality, consult a professional. He or she will be up to date on acceptable limits of pollutants and laws regarding treated water return.

Flood conveyance Flood conveyance is performed best by wetlands located in river floodplains. Restored wetlands in these areas can convey floodwaters and dissipate the energy associated with high flows. Wetlands created for the purpose of flood conveyance also lend them-

Wetlands can provide an exceptionally aesthetic experience to the urban dweller.

selves easily to other functions such as wildlife habitat and erosion control. Projects designed for flood conveyance should:

- Be of sufficient area to be effective
- Consider local conveyance requirements
- Include a complex of trees, shrubs and herbaceous vegetation suitable for retarding high flows

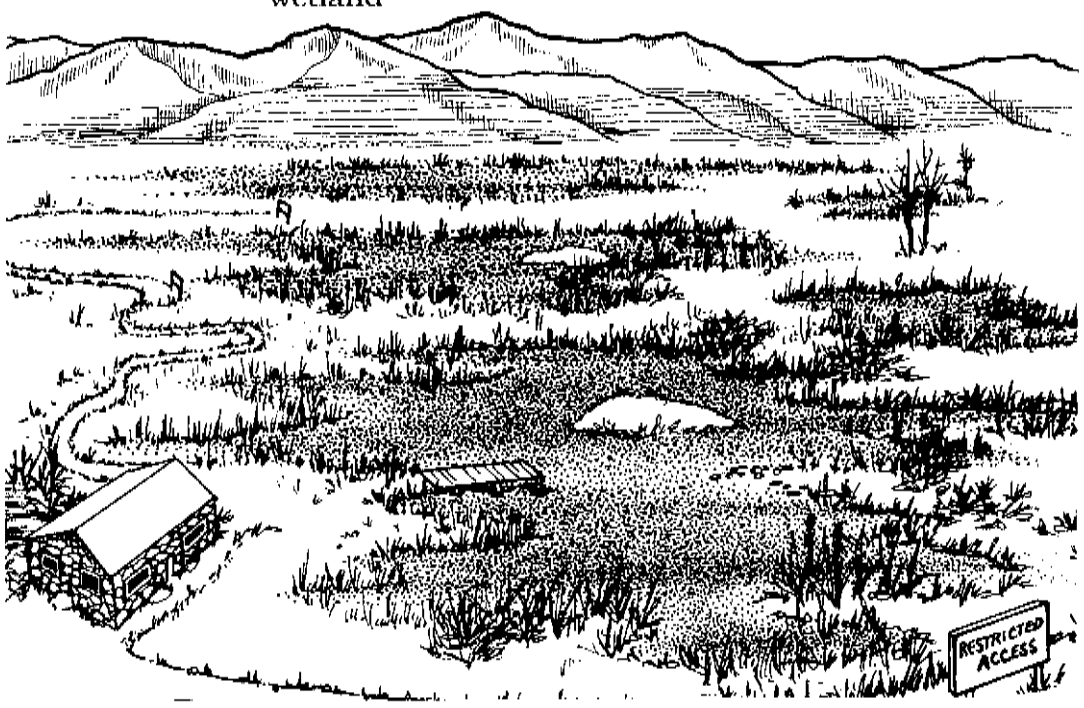
Erosion control Wetlands located along river floodplains and lake shores can be designed to reduce erosion of associated soils. Wetland plants along river banks can help stabilize soil. Wetland vegetation along lake margins reduce soil loss during periods of drawdown and seasonal recession. If you plan to create or restore a wetland for the purpose of erosion control, your plan should include:

- Plantings of tenacious native shrubs and herbs along river banks
- Semi-permanent structures such as rock riprap along river banks to provide a stable substrate for vegetation establishment
- Structural protection for vegetation during periods of establishment
- Mixtures of native grasses and reedy plants along lake margins
- Adjustments for seasonal variation in water levels
- Accommodations for the maximum flow rate during periods of high flow

Recreation and open space Wetlands can fulfill numerous recreational and open space functions. Fishing, hunting, canoeing, and hiking are all popular activities associated with wetlands. In addition, many communities are now recognizing the need to maintain open space in their areas. Wetlands can provide an exceptionally aesthetic experience to the urban dweller. Some specific design considerations for recreational/open space wetlands are:

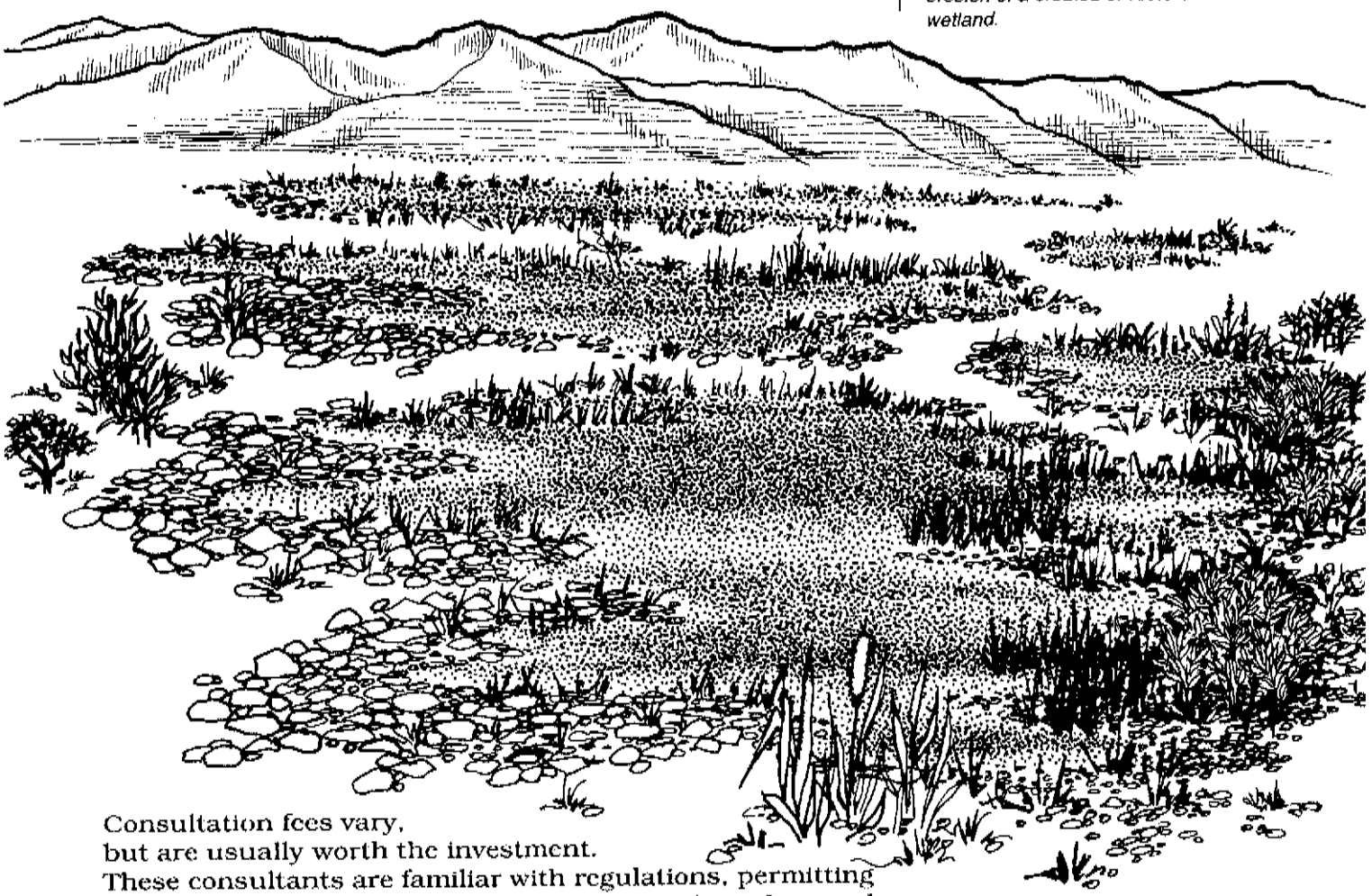
- Walkways and catwalks built over and through the wetland

Hunting, birdwatching, walking, and fishing are popular recreational activities associated with wetlands. Enhancement, creation and restoration efforts should provide opportunities for these activities. If these uses are an acceptable use of the area they should be included in the creation/restoration plan. Access should be provided, yet restrict people from sensitive areas. High use nesting areas may be screened from foot traffic by high, woody vegetation. Viewing platforms may also be provided, if feasible.



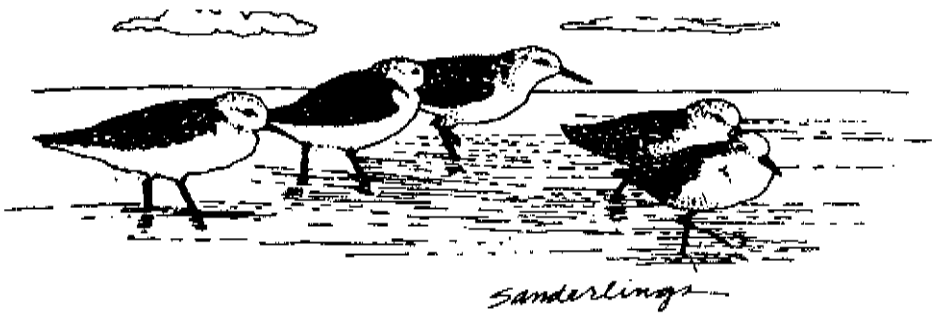
- Boat and canoe launching pads
- Visitors centers and interpretive displays
- Fishing piers
- Bridle trails
- Viewing areas
- Jogging and hiking trails
- Hunting access
- Wildlife habitat considerations

In summary, restoring, enhancing, or creating a wetland requires the identification of distinct objectives and priorities, careful thought and planning, time, money, and effort. The simplest designs are often the easiest to implement and maintain, but even the simplest of projects requires maintenance and monitoring to ensure success. Planning and designing a wetlands can be exceptionally challenging, especially to those who are not familiar with the process. Fortunately, there are environmental consultants who specialize in wetlands design (see Appendix B).



Stabilizing banks with vegetation plantings, rock riprap, and adjusting seasonal flows, can help to control erosion of a created or restored wetland.

Consultation fees vary, but are usually worth the investment. These consultants are familiar with regulations, permitting procedures, mitigation requirements, wetlands ecology and project design. They can save you time and money in the long run.


Sanderlings

THE FARMER AS LANDOWNER AND CONSERVATIONIST

Wetlands and agriculture have been bedfellows since the beginning of time. Farmers have always maintained wetlands on their property for crop irrigation and livestock watering. Unfortunately, wetland acreage in the United States is now decreasing at an alarming rate, mostly due to agricultural development. It is estimated that the U.S. has lost approximately 50 percent of its wetland acreage to development since the 1700s. Utah has lost about 30 percent of its original wetlands.

This loss of wetlands means the loss of habitat for ducks, geese, and other migratory and resident birds. Rural areas and farms are now seen as the last hope for salvaging what wetlands remain. Few farmers realize how important their conservation efforts are on a global scale. By maintaining wetlands on their property in Utah, farmers benefit wildlife throughout the entire western hemisphere.

It is not surprising, then, that farmers are increasingly becoming stewards of these valuable resources. Recently many have turned away from managing their lands exclusively for crops and livestock. Many farmers are now using wetlands to control erosion on their land, attract birds for natural insect control, and create habitat for wildlife. Many of them do this through cost-share programs administered by state and federal agencies.

COST-SHARE PROGRAMS AND ECONOMIC INCENTIVES

Cost-share programs can result in economic gain for the farmer. In a cost-share program, the farmer usually receives some kind of capital outlay from the cooperating agency to set aside areas for erosion control, wildlife food crops and shelter belts, or to construct marshes for waterfowl use. The farmer is then given an annual lease payment to maintain these components for a fixed period. In addition to receiving the payment, the farmer may also charge people to hunt on his land, thereby increasing his revenue. Lease payments can be hefty sums, ranging up to $50,000 annually.

Cost-share programs are a win-win situation. With a little effort, farmers can receive financial benefits equal to or greater than those they reaped from traditional use of their lands; agencies augment their land base of suitable wildlife habitat without actually having to acquire more land; and wildlife benefit from increased food, shelter, and protection. Additional benefits include controlling erosion by trapping run-off and controlling insect populations by attracting birds. Agencies are also pleased to find the farmer such a natural manager. Because the farmer has worked so closely with the land and natural resource, he/she is often the best expert to oversee a project.

CHAPTER 7

Cost-share programs are a win-win situation. Enrollment in these programs is easy when you know how.

Following is a list of cost-share economic incentive programs in which private landowners can participate. Programs are administered by a variety of agencies and include:

- Water Quality Incentive Projects
- Wetlands Reserve Program
- Conservation Reserve Program
- Stewardship Incentive Program
- Wetlands Easement Program
- Partners for Wildlife

Enrollment in these programs is easy, as long as you know which agency administers a program and what each one requires of its participants. Following is a brief description of each program listing the overseeing agency, terms of agreement, and potential economic benefit to the participant.

Water Quality Incentive Projects (WQIP) WQIP are U.S. Department of Agriculture (USDA) projects administered by the Agricultural Stabilization and Conservaton Service (ASCS) and assisted by the Soil Conservation Service (SCS). The goal of WQIP is to reduce water pollution by implementing management practices on private lands in an environmentally and economically sound way. In a WQIP, the landowner develops a Water Quality Resource Management Plan (WQRP) with the aid and approval of the SCS. The landowner enters into a long-term agreement (approximately 3 years) to maintain and uphold the goals of the WQRP. Eligible landowners can receive up to $3500 annually for their participation. To participate in WQIP, the landowner must coordinate the project through his/her local ASCS office, which obtains its funding from Washington, D.C. An open application period is set by the main office of the ASCS in Washington, D.C. Once this application period is open, local ASCS offices can then request funding for projects in their areas on a case-by-case basis. Because the application period is opened irregularly, WQIP is not available for participation every year.

Wetlands Reserve Program (WRP) The WRP is a USDA program that is administered by the ASCS. In WRP, eligible landowners grant the ASCS permanent easements to privately owned farmed wetlands or prior converted wetlands. The landowner agrees to cease farming on the property. In exchange, ASCS pays the landowner an annual subsidy and cost-shares 75 percent of the eligible costs with the landowner to restore the area. The landowner retains the right to hunt and fish, hay or graze, manage timber, or sell mineral rights on the land provided the terms of the agreement are not violated. This program has yet to be implemented in Utah and is currently in pilot stage in nine other states. Utah farmers may be able to participate in the near future.

Contact your SCS or ASCS office if you are interested in participating in such a program.

Agricultural Conservation Program (ACP) The ACP is a USDA cost-share program administered by the ASCS assisted by several other cooperating state and federal agencies. The objective of ACP is to implement conservation practices on agricultural land which would protect soil, water, wildlife, and woodland resources. Farmers and ranchers can receive cost-share payments up to 75 percent for their participation in establishing conservation plans. The program emphasizes a long-term commitment from the participant to maintain practices which would minimize problems associated with critical soil erosion, water quality, and water pollution. Agreements generally range from 1 to 10 years. Practices eligible for cost-share payments are determined by a farmer-elected county committee. Acceptable practices include permanent vegetative cover establishment and improvement, stripcropping, terracing, diversions, wind-break establishment and improvement, grazing land protection, cropland protective cover, feedlot windbreaks, vegetative fence rows, contour farming, and reduced-tillage and no-till systems. While many other cost-share programs are funded irregularly, the ACP is well-funded in Utah. This is the "best bet" for Utah's farmers.

Conservation Reserve Program (CRP) The CRP is a USDA cost-share program administered by ASCS with assistance from the SCS, U.S. Forest Service, Extension Service, and Division of Sovereign Lands and Forestry. CRP is a long-term conservation program designed to take cropland out of production and convert it to trees or other permanent wildlife cover (e.g., shallow ponds for waterfowl). Eligible landowners receive up to $50,000 annually for 10-15 years for their participation, as well as a 50 percent cost-share toward the establishment of trees or permanent wildlife cover. In exchange, the owner must develop and follow an approved conservation plan for the time specified under the terms of agreement (10-30 years). Approved conservation practices include permanent establishment of native species cover, forest tree plantations, field windbreak establishment, and shallow water areas for wildlife.

Stewardship Incentive Program (SIP) The SIP is a USDA cost-share program administered by the U.S. Forest Service and by the Division of Sovereign Lands and Forestry. Through SIP, the Forest Service offers financial and technical assistance to landowners who wish to manage their forest lands for multiple use. The landowner works with a professional forester to develop a plan designed to attain a multiple-use objective. Landowners can receive up to 75 percent of their expenses for implementing a recommended conservation practice. Eight categories are approved for SIP; four are directly related to wetlands and riparian areas. Plans are approved for soil and water protection improvement, fisheries habitat enhancement, wildlife habitat enhancement, and riparian and wetland protection and improvement. Eligible landowners must own less than

Farmers and ranchers can receive cost-share payments up to 75 percent for their participation in establishing conservation plans. ACP is the "best bet" for Utah farmers.

A wetland easement is a permanent or perpetual agreement entered into by a landowner and the FWS. The landowner receives a single payment in return for not draining, burning, leveling, or filling wetlands on his/her property.

1000 forested acres, possess an approved forest stewardship plan, and be willing to commit to doing the prescribed practices outlined in the plan.

Wetlands Easement Program The Wetlands Easement Program is a FWS cost-share program financed by revenue generated by the sale of Duck Stamps. A wetland easement is a permanent or perpetual agreement entered into by a landowner and the FWS. The landowner receives a single payment in return for not draining, burning, leveling, or filling wetlands on his/her property. The easement covers only the wetlands specified in the agreement. To be eligible for a wetland easement, the property must contain a wetland which is valuable to waterfowl and be located in a county which has been approved for the program. The easement covers certain existing wetlands or those that recur through natural or man-made causes. Impoundments by dams and dikes do not qualify. Previously drained wetlands will be covered only if the landowner agrees to restore the wetland. The easement does not restrict normal farming practices such as cropping, haying, grazing, plowing, or working wetlands when they are dry due to natural causes. Landowners still have the right to open or close their lands to hunting or trapping and also retain any existing mineral rights.

Partners for Wildlife Partners for Wildlife is a FWS program which seeks to improve and protect fish and wildlife habitat on private lands. This particular program is not limited to farmers, but rather to any private landowner who wishes to make voluntary improvements on his/her land to enhance or restore wildlife habitat. The FWS provides technical assistance and, in some instances, may share or pay all costs. Habitat restoration and management can be in the form of wetland restoration, nesting structures or islands, food and shelter areas, soil and water quality improvement, grazing plans which benefit domestic animals and wildlife, pesticide use reduction, native plant restoration, and water level management. The FWS offers assistance in cooperation with other agencies and corporations which donate technical expertise, equipment, time, and funds. To date, 9000 landowners have joined the Partners for Wildlife nationwide and have restored thousands of acres of wetland habitat and associated uplands.

Agricultural Resource Development Loan The Agricultural Resource Development Loan (ARDL) program is not a cost-share program, but a low interest loan program administered by the Utah Department of Agriculture. Farmers can borrow money for projects at a low interest rate and repay the money over time. The ARDL program is locally approved and administered, ensuring good communication and less hassle. If you are interested in participating in this program, contact the local office of the Utah Department of Agriculture.

Of course, maintaining wildlife habitat on private property is not for everyone. Charging others to hunt and fish on your land can be costly, especially if someone becomes injured or if property is damaged. Additionally, wetlands attract insects. Not everyone is prepared to deal with this

aspect of having a wetland on their property. Therefore, give careful consideration to such matters before you enter into any longterm agreements.

MANAGEMENT GOALS FOR WILDLIFE

Two of the major goals of wildlife management are (1) providing habitat to maximize plant and animal diversity, and (2) managing habitat to increase productivity of animal populations. The second goal cannot be accomplished without attaining the first. *It has long been a tenet of wildlife management that to protect and produce wildlife populations you must first provide and protect habitat.* There are several means by which private landowners can accomplish these two goals. Following is a list of land-use practices which can be compensated for by one of the aforementioned cost-share programs.

It has long been a tenet of wildlife management that to protect and produce wildlife populations you must first provide and protect habitat.

Ponds and Marshes

Ponds and shallow water areas provide food, shelter, and homes to a number of animals, especially waterfowl. On agricultural lands, ponds can be constructed to prevent soil erosion and control flooding, as well as provide water storage for livestock. Birds and other wildlife directly benefit from these ancillary purposes. Waterfowl use these areas to nest and breed while upland birds use ponds as watering places. Ponds can also be stocked with fish and used for recreational purposes. Stocking ponds with fish requires a pond permit from the Division of Wildlife Resources Aquatic Section. Ponds also attract bats which are natural insect controllers.

Cover and Hay Crops

Crops such as grasses and legumes can provide food and shelter for many species of animals. In the spring, nesting birds, such as pheasant, use these fields because they provide abundant food, protection, and an ideal place to raise young. Delaying mowing until after the nesting season (mid-summer) also increases bird survival. Hay fields can also provide forage for larger birds and mammals such as deer, wild turkey and Canada and snow geese.

Crops such as grasses and legumes can provide food and shelter for many species of wildlife. Birds, such as pheasants, nest in these fields because they provide abundant food and shelter. Delaying mowing until after the nesting season (late summer) and mowing from the inside of the field to the outside increases bird survival. Hay fields can also provide forage for larger birds and mammals, such as wild turkey, geese, and deer.

Nesting boxes may also be used to attract bluebirds, kestrels, woodpeckers, and martins.

Stripcropping

Stripcropping is the practice of alternating strips of row crops with soil-conserving strips of small grain or cover crops. Stripcropped fields can attract double the amount of ground-nesting birds as continuous fields. The small grain and cover strips trap soil lost from the nearby row crop, reducing soil erosion. They also provide lots of "edge" habitat for species. Edge is an overlap of two different kinds of habitat that offers a diverse source of food and shelter. This "edge-effect" allows many more species to co-exist in the same area because of the diversity of resources.

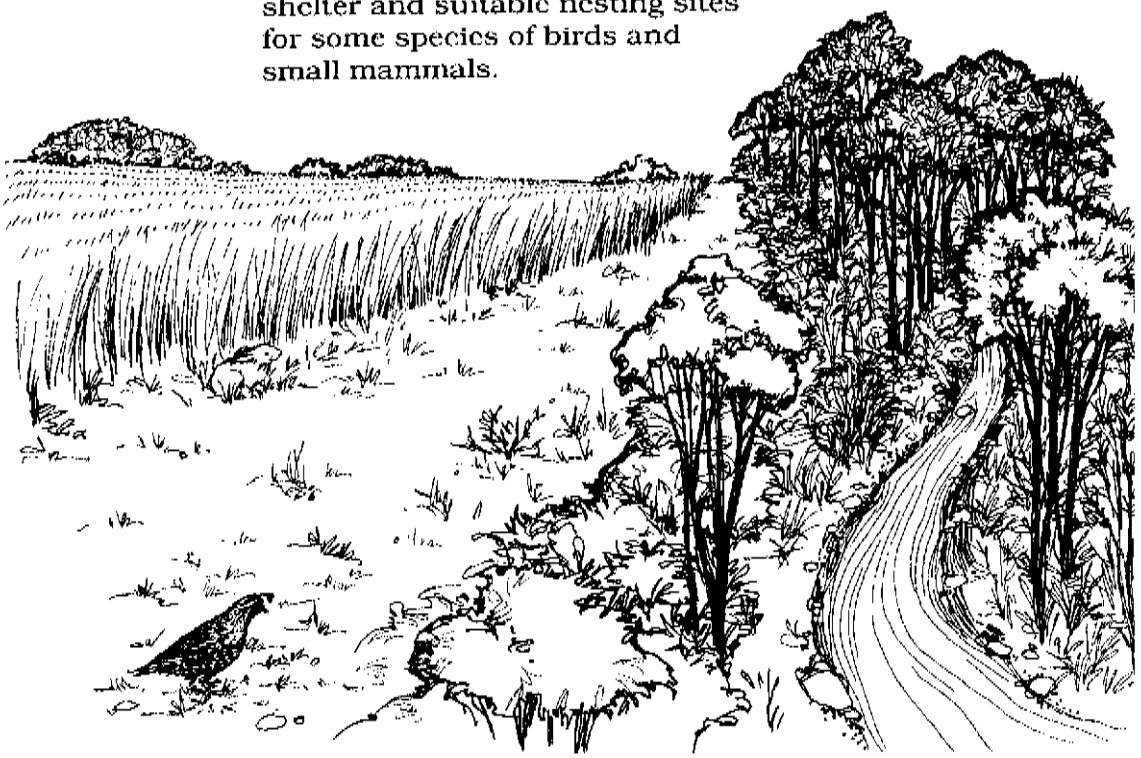
Windbreaks and Shelter Belts

Establishing windbreaks and shelter belts on your property will benefit you as well as wildlife. Windbreaks help control wind erosion, conserve moisture, and help to more evenly distribute snowfall around fields and structures, such as your home or barn. Depending on their purpose and your location, windbreaks and shelter belts can be made up of conifers and pines or hardwoods and shrubs. They provide cover and shelter for wildlife especially during the winter months. Like stripcropping, they provide edge habitat, which attracts a diverse number of species.

Fence Rows and Hedges

Hedges and fences planted with shrubs provide nesting habitat for many ground and shrub-nesting birds. Fence rows along cropped fields provide birds with adequate cover and an abundant food supply. Shrubs like the multiflora rose and chokecherry are excellent for this purpose because they are easy to maintain and form a living fence that requires no wire or braces. In some agricultural areas, these provide the only available shelter and suitable nesting sites for some species of birds and small mammals.

Vegetation can be used as a filter to catch sediments, crop nutrients and pesticides before they enter streams, creeks, rivers or ponds. These vegetative filter strips can be composed of grasses, shrubs and trees that work to reduce soil erosion, improve water quality and provide permanent cover for a variety of wildlife species. Using vegetative filter strips results in cleaner water, healthy waterways and a greater diversity in landscape and wildlife.



Vegetative Filter Strips

Filter strips are grasses, trees, and permanent wildlife cover on the edges of cropped land next to streams, creeks, rivers, and ponds. Vegetative filter strips provide food and shelter for wildlife while reducing soil erosion and improving water quality. The term "filter" is used because these plantings act as natural filters. As sediment, crop nutrients, and pesticides pass through these strips on their way to the water course, they are trapped or absorbed. The result is cleaner and clearer water; a benefit to humans and wildlife alike. As a consequence, fish may return to an area, new birds may breed, and mammals may travel more freely along the protected corridor.

Nesting Structures

Sometimes, the availability of suitable habitat is not enough; constructing a nest often presents the biggest challenge for waterfowl in an agricultural area. Suitable nesting materials and sites are often scarce. The key to waterfowl production is successful nesting and brood rearing. By providing nesting boxes and platforms, farmers can assist these birds and increase production. Nesting boxes may also be used to attract bluebirds, kestrels, woodpeckers, and martins.

Prescribed Burning

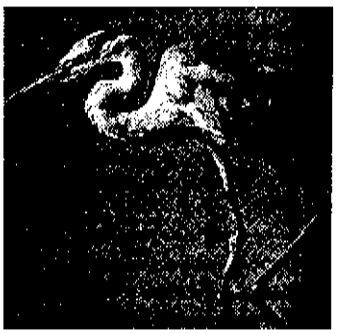
While burning marshes and grasslands during the nesting season is harmful to birds, setting fires at other times of the year may actually increase waterfowl production. After the first year of burning, nesting success is actually reduced. In areas burned every 3-4 years, however, nesting success is actually greater than in unburned areas. Fires can also open up choked marshes, providing patches of habitat ranging from open water to bulrush thickets. The burned over wetland attracts a more diverse community of waterfowl than an unburned area due to this patchier distribution of habitat types. Of course, too much fire can be detrimental. Prescribed burning must be done carefully.

THE IMPORTANCE OF WATER

Wildlife need three basic resources: food, cover, and water. The relative importance of these resources varies from region to region. In Utah, for example, water is a very limited element. The emphasis on cost-share programs in Utah, then, should be on water project developments.

For some individuals, building a pond on private property can be a lucrative venture. Not only could you receive cost-share payments from a cooperating agency, but receive supplemental income from charging others to hunt and fish on your property. Hunting in Utah is very popular, generating a major source of revenue for the state. Many species of waterfowl can be found in Utah because our wetlands lie along the Central and Pacific flyways. These factors, in conjunction with increasingly limited hunting access near urban areas, could add up to dollars for the private landowner.

Many species of waterfowl can be found in Utah because our wetlands lie along the Central and Pacific flyways.



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NOTES

Terms to Know

GLOSSARY

alkaline Term applied to water with a pH greater than 7.4.

aquatic bed Class used in Cowardin, et al. (1992) to describe wetlands and deepwater habitats dominated by plants that grow principally on or below the surface of the water for most of the growing season in most years.

aquatic plant Type of plant usually found in Lacustrine and Palustrine habitats (see aquatic bed).

COE Acronym for federal office of the United States Army Corps of Engineers.

DWR Acronym for state office of Utah Division of Wildlife Resources.

emergent plants Erect, rooted, herbaceous plants that may be temporarily to permanently flooded at the base, but do not tolerate prolonged inundation of entire plant (rel: see persistent and nonpersistent emergents).

EPA Acronym for federal office of United States Environmental Protection Agency.

FWS Acronym for federal office of United States Fish and Wildlife Service.

growing season The frost-free period of the year. Varies from one region of the country to another (see U.S. Dept. of Interior, National Atlas, 1970:110-111 for regional definitions).

hydric Relating to or requiring considerable moisture.

hydrophyte A plant growing in and adapted to an aquatic or very wet environment.

lacustrine System defined by Cowardin et al., (1992) to describe deepwater habitats. From the Latin *lacus* meaning lake (of or relating to lakes).

lake eutrophication Process which occurs in lakes when mineral and organic nutrients increase and the amount of available oxygen decreases. Eutrophic lakes provide a favorable environment for plants and hostile environment for animals.

littoral Subsystem of Lacustrine system defined by Cowardin et al. (1992) to describe wetland lacustrine habitats from shoreline boundary to a depth of 2 m (6.6 ft) below water or to the maximum extent of nonpersistent emergents.

limnetic Subsystem of Lacustrine system defined by Cowardin et al. (1992) to describe deepwater lacustrine habitats.

montane Of, growing in, or inhabitating mountainous areas. From the Latin *montanus* meaning mountain.

nonpersistent emergent Emergent hydrophytes whose leaves and stems break down at the end of the growing season so that most above-ground portions of the plants are easily transported by currents, waves, or ice. The breakdown may result from normal decay or the physical force of strong waves or ice. At certain seasons of the year there are no visible traces of the plants above the surface of the water (e.g., wild rice).

palustrine System defined by Cowardin et al. (1992) to describe shallow nontidal wetlands that are dominated by trees, shrubs, or persistent emergent plants. Also describes unvegetated shallow nontidal wetlands that are less than 8 ha (20 acres) with a water depth in the deepest part of the basin less than 2 m (6 ft) at low water.

perennial Lasting or active through the year or over many years; recurrent.

persistent emergent Emergent hydrophytes that normally remain standing at least until the beginning of the next growing season (e.g., cattails, bulrushes).

playa Nearly level area at the bottom of a topographic depression, intermittently covered with water during wet times. Usually found in the desert.

riparian Of, on, or relating to the bank of a natural course of water. Regional variations of definintion exist depending on climate and are usually based on vegetation or topography.

riverine System defined by Cowardin et al. (1992) to describe all wetlands and deepwater habitats contained within a river channel except those dominated by trees, shrubs, or persistent emergent plants.

saline Term used to describe water which contains various dissolved salts. Usually used to describe inland water bodies.

submergent plant A hydrophytic plant, either rooted or nonrooted, which lies entirely beneath the water surface, except for the flowering parts of some species. swale A topographic depression with saturated soils, usually containing grassy vegetation.

unconsolidated bottom Class defined by Cowardin et al. (1992) which includes all wetland and deepwater habitats with at least twent-five percent cover of particles smaller than stones (e.g., cobble, gravel, sand, mud), and a vegetative cover less than thirty percent.

unconsolidated shore Class defined by Cowardin et al. (1992) which includes all wetland habitats with substrates which have less than seventy-five percent cover of stones, boulder, or bedrock, less than thirty percent cover of vegetation, and irregularly or intermittently exposed.

upland Term used to describe habitat areas which are not associated with water or do not occur in topographic depressions. Usually applied to elevated, non-wet areas adjacent to wetlands. If occurs at high elevations, usually referred to as montane.

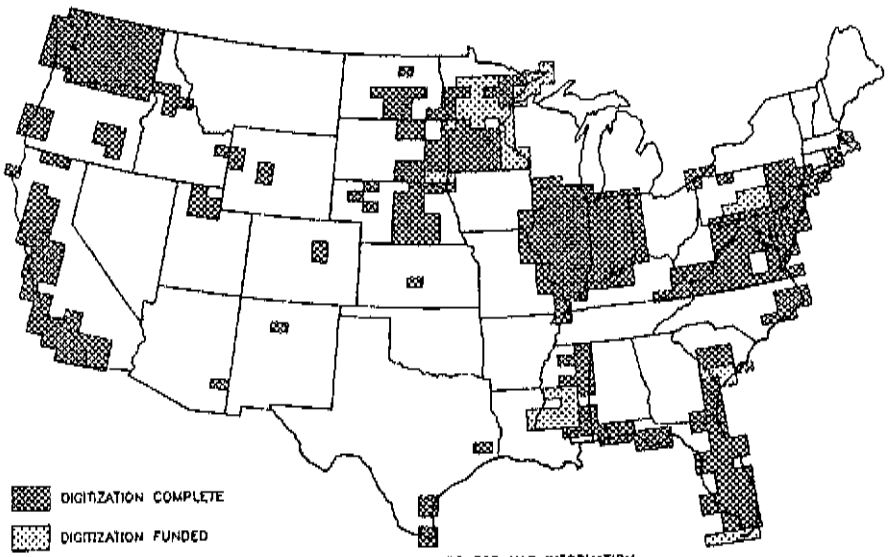
UTM Acronym for Universal Transverse Mercator, a global coordinate system which describes position in relation to a global grid. The UTM system has sixty north-south zones, each six degrees of longitude wide. It can be used to describe location in the same way latitude and longitude are used and can be found on topographic maps. wetland Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adacted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas.

Terms used in this workbook

INDEX

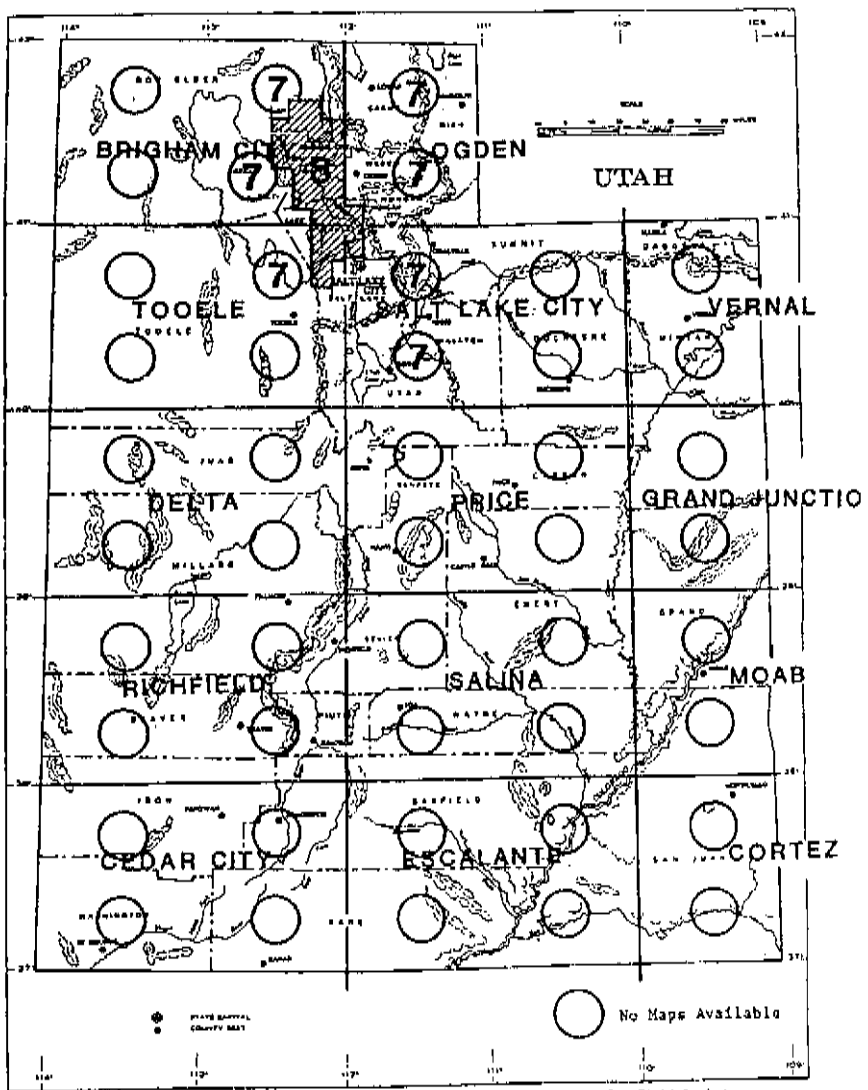
National Wetlands Inventory

APPENDIX A



TELEPHONE 1-800-USA-MAPS FOR MAP INFORMATION
(IN VIRGINIA (703) 648-6045)

STATUS OF NATIONAL WETLANDS INVENTORY MAPS FOR UTAH



1 Area Under Contract
2 Photography Undergoing Interpretation
3 Photography in Denver for Quality Control
4 Photography in St. Petersburg for Draft Map Production
5 Draft Maps in Denver for Field Review
6 Draft Maps in St. Petersburg for Final Map Producti..
7 Final Maps Available
8 Final Maps Digitized

National Wetlands Inventory Maps
Available for Utah

Map Unit Name (1:24,000)	Map Unit Name (1:7,500)	Digitized
Brigham City NE	Bear River City	Yes
	Blind Springs	No
	Brigham City	Yes
	Bulls Pass	No
	Clarkston	No
	Coyote Point	No
	Cutler Dam	No
	Golden Spike Monument	No
	Honeyville	No
	Howell	No
	Lake Ridge	No
	Lampo Junction	No
	Limekiln Knoll	No
	Locomotive Springs	No
	Monument Peak	No
	Monument Peak NE	No
	Monument Peak NW	No
	Monument Peak SW	No
	Monument Point	No
	Portage	No
	Public Shooting Grounds	Yes
	Rattlesnake Pass	No
	Ridgedale Pass	No
	Riverside	No
	Rozel	No
	Salt Wells	No
	Snowville	No
	Spring Bay SW	No
	Sunset Pass	No
	Thatcher Mountain	Yes
	Thatcher Mountain SW	Yes
	Tremonton	Yes
Brigham City SE		
	Antelope Island North	Yes
	Buffalo Point	No
	Carrington Island	No
	Carrington Island NE	No
	Carrington Island NW	No
	Carrington Island SW	No
	Clearfield	Yes
	Deardens Knoll	No
	Dolphin Island East	No
	East Promontory	Yes
	Fremont Island	Yes
	Fremont Island SW	No
	Gunnison Island	No
	Gunnison Island NE	No
	Gunnison Island SW	No
	Indian Cove	No
	Lakeside	No
	Messix Peak	No
	Mouth of Bear River	Yes
	Ogden Bay	Yes
	Plain City	Yes
	Plain City SW	Yes
	Pokes Point	No
	Promontory Point	No
	Roy	Yes
	Rozel Point	No
	Rozel Point SW	No

Map Unit Name (1:24,000)	Map Unit Name (1:7,500)	Digitized
Brigham City SE, cont.	Sally Mountain	No
	Strongs Knob	No
	Whistler Canal	Yes
	Willard	Yes
	Willard Spur	Yes
Elko NE	Wendover SE	No
Elko SE	Ferguson Flat	No
Lund NE	Garrison	No
	Needle Point Spring	No
	Tweedy Wash	No
Ogden NW	Bear Lake South	No
	Birch Creek Reservoirs	No
	Boulder Mountain	No
	Curtis Ridge	No
	Garden City	No
	Hardware Ranch	No
	Laketown	No
	Leefe	Yes
	Logan	No
	Logan Peak	No
	Meadowville	No
	Mount Elmer	No
	Mount Pisgah	No
	Naomi Peak	No
	Newton	No
	Old Canyon	No
	Paradise	No
	Porcupine Reservoir	No
	Randolph	No
	Red Spur Mountain	No
	Rex Peak	Yes
	Richmond	No
	Sage Creek	No
	Sheeppen Creek	No
	Smithfield	No
	South Lake	Yes
	Temple Peak	No
	Tony Grove Creek	No
	Trenton	No
	Wellsville	No
	Woodruff	No
	Woodruff Narrows	No
Ogden SW	Browns Hole	No
	Bybee Knoll	No
	Castle Rock	No
	Causey Dam	No
	Dairy Ridge	No
	Devils Slide	No
	Durst Mountain	No
	Francis Canyon	No
	Heiners Creek	No
	Henefer	No
	Horse Ridge	No
	Huntsville	No
	James Peak	No
	Kaysville	Yes
	Lost Creek Dam	No
	Mantua	No
	McKay Hollow	No
	Meachum Ridge	No
	Monte Cristo Peak	No

National Wetlands Inventory Maps
Available for Utah

Map Unit Name (1:24,000)	Map Unit Name (1:7,500)	Digitized
Ogden SW, cont.	Morgan	No
	Murphy	No
	Neponset Reservoir NE	No
	Neponset Reservoir NW	No
	North Ogden	No
	Ogden	No
	Peck Canyon	No
	Peterson	No
	Porcupine Ridge	No
	Sharp Mountain	No
	Shearing Corral	No
	Snow Basin	No
	Wahsatch	No
Pocatello SE	Co-op Spring	No
	Grover Canyon	No
	Henderson Creek	No
	Samaria	No
	Stone	No
Preston SW	Bear Lake North	No
	Boundary Ridge	No
	Pegram Creek	No
	Saint Charles	No
Rock Springs SW	Hawks Nest	No
	Minnies Gap	No
	Red Creek Ranch	No
	Richards Gap	No
Salt Lake City NW	Big Dutch Hollow	No
	Bountiful Peak	No
	Brighton	No
	Coalville	No
	Crandall Canyon	No
	Draper	No
	Dromedary Peak	No
	East Canyon Reservoir	No
	Erickson Basin	No
	Farmington	Yes
	Fort Douglas	No
	Francis	No
	Heber City	No
	Hidden Lake	No
	Hoyt Peak	No
	Kamas	No
	Midvale	No
	Mount Aire	No
	Mountain Dell	No
	Park City East	No
	Park City West	No
	Porterville	No
	Red Hole	No
	Salt Lake City North	Yes
	Salt Lake City South	No
	Slader Basin	No
	Soapstone Basin	No
	Sugar House	No
	Turner Hollow	No
	Upton	No
	Wanship	No
	Woodland	No
Salt Lake City SW	Aspen Grove	No
	Billies Mountain	No
	Bridal Veil Falls	No

Map Unit Name (1:24,000)	Map Unit Name (1:7,500)	Digitized
Salt Lake City SW, cont.	Center Creek	No
	Charleston	No
	Co-op Creek	No
	Goshen Valley North	No
	Granger Mountain	No
	Heber Mountain	No
	Jimmies Point	No
	Jordan Narrows	No
	Lehi	No
	Lincoln Point	No
	Orem	No
	Pelican Point	No
	Provo	No
	Rays Valley	No
	Saratoga Springs	No
	Soldiers Pass	No
	Spanish Fork	No
	Spanish Fork Pass	No
	Springville	No
	Strawberry Reservoir NE	No
	Strawberry Reservoir NW	No
	Strawberry Reservoir SE	No
	Strawberry Reservoir SW	No
	Timpanogos Cave	No
	Twin Peaks	No
	Two Tom Hill	No
	Wallsburg Ridge	No
	West Mountain	No
	Wolf Creek Summit	No
Tooele NE	Antelope Island	Yes
	Antelope Island South	Yes
	Badger Island	No
	Badger Island NW	No
	Bingham Canyon	No
	Burmester	No
	Corral Canyon	No
	Craner Peak	No
	Delle	No
	Farnsworth Peak	Yes
	Flux	No
	Grantsville	No
	Hastings Pass	No
	Hastings Pass NE	No
	Hastings Pass SE	No
	Lark	No
	Low	No
	Magna	No
	Mills Junction	No
	North Willow Canyon	No
	Plug Peak	No
	Plug Peak NE	No
	Plug Peak NW	No
	Plug Peak SE	No
	Poverty Point	No
	Puddle Valley Knolls	No
	Quincy Spring	No
	Salt Mountain	No
	Saltair	Yes
	Saltair NE	Yes
	Timpie	No
	Tooele	No

APPENDIX B

Where to Get Help

FEDERAL AGENCIES

Army Corps of Engineers, 1403 South 600 West, Bountiful, Utah 84010 (801) 295-8380

Bureau of Land Management, Salt Lake District Office, 2370 South 2300 West, West Valley City, Utah 84119 (801) 977-4300

Environmental Protection Agency, Region VIII Office, Denver Place, 999 18th Street, Denver, Colorado 80202-2405 (303) 293-1579

Fish and Wildlife Service, 2060 Administration Building, 1745 West 1700 South, Salt Lake City, Utah 84104 (801) 524-5630

Forest Service, Federal Office Building 324 25th Street, Ogden, Utah 84401 (801) 625-5112

Soil Conservation Service, Wallace F. Bennett Federal Building, P.O. Box 11350 Salt Lake City, Utah 84147 (801) 524-5054

STATE AGENCIES

Automated Geographic Reference Center, 4267 State Office Building, Salt Lake City, Utah 84114 (801) 538-3162

Division of Water Quality, Department of Environmental Quality, P.O. Box 144870, Salt Lake City, Utah 84114-4870 (801) 538-6146

Division of Water Resources, 1636 West North Temple, Suite 310, Salt Lake City, Utah 84116 (801) 538-7230

Division of Water Rights, 1636 West North Temple, Suite 220, Salt Lake City, Utah 84116 (801) 538-7240

Division of Wildlife Resources, 1596 West North Temple, Salt Lake City, Utah 84116-3195 (801) 538-4700

State Lands and Forestry, 355 West North Temple, 3 Triad Center, Suite 400, Salt Lake City, Utah 84180-1204 (801) 538-5508

PRIVATE CONSULTANTS

(NOTE: The following list of consultants is provided for the convenience of the workbook user. The Division of Wildlife Resources in no way endorses these particular consultants over any other unlisted names.)

Applied Ecological Services, Incorporated, P.O. Box 65595, Salt Lake City, Utah 84165-0595 (801) 486-3993 (800) 729-3297

Bingham Engineering, 5160 Wiley Post Way, Salt Lake City, Utah 84116 (801) 532-2520

BioWest, Incorporated, 1063 West 1400 North, Logan, Utah 84321 (801) 752-4202

CTC-Geotek, Incorporated, 361 West Ironwood, Salt Lake City, Utah (801) 485-8400

Ecosystem Research Institute, 975 South State Highway, Logan, Utah 84321 (801) 752-5824

Ecotone Environmental Consulting, 123 East 200 North, Logan, Utah 84321 (801) 752-2204

Hansen, Allen, and Luce, Incorporated, Consulting Engineers, 6771 South 900 East, Midvale, Utah 84047 (801) 566-5599

The Jack Johnson Company, 1910 Prospector Avenue, Park City, Utah 84060 (801) 645-9000

JBR Consultants Group, 8160 Highland Drive, Suite A-4, Sandy, Utah 84093 (801) 943-4144

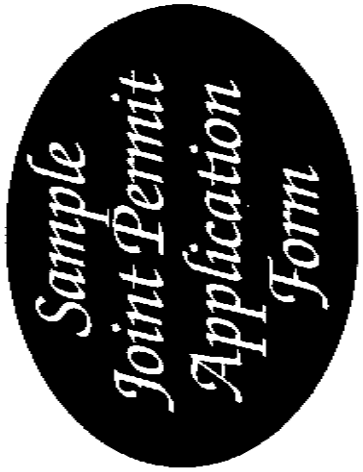
Pioneer Environmental Services, Inc., One Environmental Center, 980 West 1800 South, Logan, Utah 84321 (801) 753-0033

The Sear-Brown Group, 2745 East Parley's Way, Salt Lake City, Utah (801) 486-8787

SWCA, Inc., Environmental Consultants, 39 West Market Street, Suite 200, Salt Lake City, Utah 84101 (801)322-4307

Wasatch Wetland Institute, 5217 Spring Leaf Drive, Salt Lake City, Utah 84117 (801) 272-9160

NOTES



APPENDIX C

JOINT PERMIT APPLICATION FORM

U. S. ARMY CORPS OF ENGINEERS - FOR SECTIONS 404 AND 10
UTAH STATE ENGINEER'S OFFICE - FOR NATURAL STREAM CHANNELS

Application Number _____ / _____
(Assigned by:) Corps State Engineer

Applicant's Name (Last, First M.I.)	Authorized Agent	Telephone Number and Area Code

Applicant's Address (Street, RFD, Box Number, City, State, Zip)

PROJECT LOCATION				
Quarter Section(s)	Section	Township	Range	Base & Meridian

County	Watercourse to be altered	Check one: ___Within city limits ___ Outside city limits List town or nearest town:

Project location or address:

Brief description of project:

Purpose (justification) of project:

Is this a single and complete project or is it part of a larger project, continuing project, or other related activities? If so, please describe the larger project or other related activities.

If project includes the discharge of dredged or fill material:

Cubic yards of material:

Acreage or square footage of waters of the United States, including wetlands, affected by the project:

Source and type of fill material:

Alternatives (other ways to accomplish the project purpose):
Names and addresses of adjacent property owners or other individuals who may be affected by this project:
List other authorizations required by Federal, state or local governments (i.e.; National Flood Insurance Program), and the status of those authorizations.

Estimated starting date of project	Estimated completion date

(If project has already been partially or totally completed, indicate date of work. Indicate existing work on drawings).

Application is hereby made for a permit or permits to authorize the activities described herein. I certify that I am familiar with the information contained in the application, and that to the best of my knowledge and belief such information is true, complete and accurate. I further certify that I possess the authority to undertake the proposed activities or am acting as the duly authorized agent of the applicant.

Signature of applicant	Date

I hereby certify that _____ is acting as my agent for this project.

Agent's address and telephone number

INSTRUCTIONS

Applications which do not include the following will not be processed.

For a complete application, you **MUST** include the following on 8 1/2 by 11 paper (for large projects, multiple sheets with a key may be used). Clear, hand-drawn plans approximately to scale are acceptable.

1. An accurate location map (USGS quadrangle map preferred)
2. A plan view of the proposed activity (as seen from above) including dimensions of work.
3. A cross-section view of the proposed activity (may use typical cross-section for large projects) including dimensions.
4. For projects which include wetlands, an accurate wetland delineation must be prepared in accordance with the current method required by the Corps.

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STATE OF UTAH
NATURAL RESOURCES
Division of Wildlife Resources

EPA

TAKE Pride IN UTAH

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